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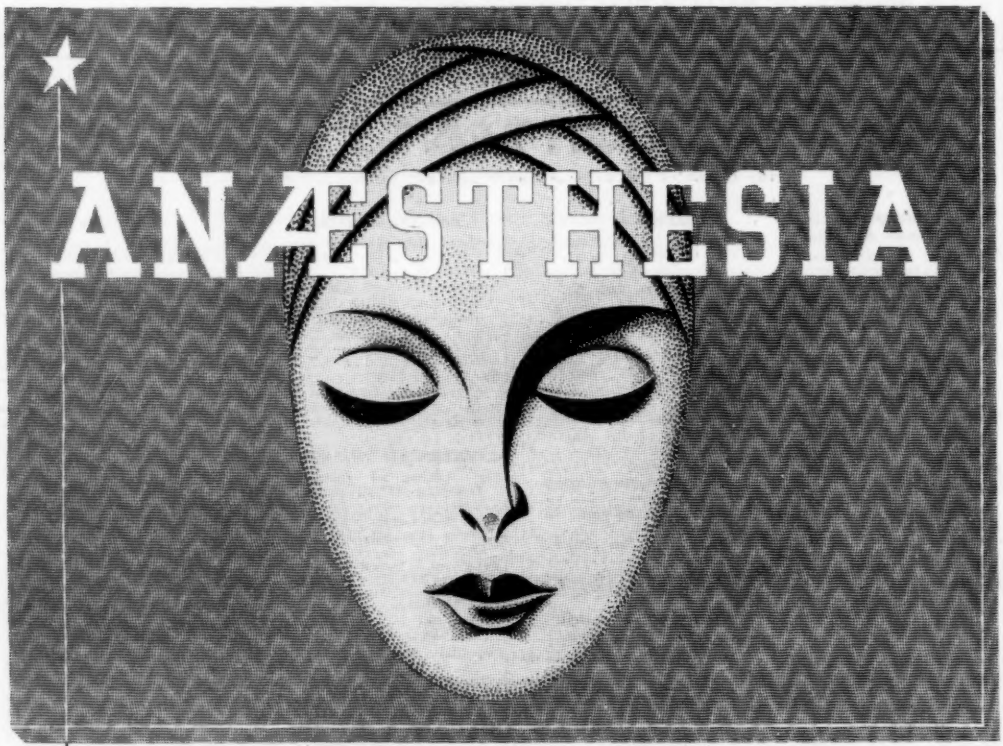

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ADDRESSES AND ORIGINAL ARTICLES

PERFORATED PEPTIC ULCER

CHANGES IN AGE-INCIDENCE AND SEX-DISTRIBUTION IN THE LAST 150 YEARS

By Denys Jennings, B.M. Oxfd

MEDICAL RESEARCH COUNCIL FELLOW 1937–39; HON. RESEARCH CLINICAL ASSISTANT AT THE RADCLIFFE INFIRMARY, OXFORD

One point in the ætiology of any disease is so obvious that it is never emphasised, and in consequence it gets forgotten. The idea of the soil and the seed, susceptibility and stress, applies not only to bacterial infections but to nearly all common diseases; and it depends solely on the point of view whether the constitutional susceptibility or the environmental stress appears the more important. The public-health officer sits in an office with statistics in front of him and knows that under certain conditions of nutrition scurvy, rickets, and pellagra appear in a population. The general practitioner visits patients in their homes and knows that the sufferers from deficiency disease have often just as good a diet as others who remain healthy; from his point of view a constitutional factor determines whether a patient is affected or not.

As a result of recent discoveries it is too often assumed that the old-fashioned doctor was wrong, and the statement has crept into textbooks that heredity plays no part in the ætiology of this or that deficiency disease. This is nonsense. The comprehensive German studies on twins now proceeding show how uncommon it is for any disease to be independent of heredity. It is also a daily experience in experimental work on animals that large individual variations exist in susceptibility to drugs and poisons, to carcinogenic agents, or to deficient diets; and the importance of heredity in producing these differences can be shown by breeding pure lines. Lehmann (1936) and others, working on human twins with rickets, have made out a case that hereditary constitutional differences are far more important than dietetic differences in determining the incidence of rickets. The reason why rickets exists in the community at all is because the general standard of nutrition is near the rachitogenic point. According to how bad the conditions are, 5, 10, or 50 per cent. of children may be affected; but which 10 per cent. are affected may be decided largely by heredity, especially under conditions of famine, when the differences between rich and poor are lessened.

Owing to what might be termed the parochialism of modern medicine a paradoxical situation has arisen. Diseases which we see in perspective, because they affect other countries or can be reproduced in animals, are due to faults in the mode of life; but diseases which affect ourselves are due to constitutional faults, only to be eradicated by eugenic measures. We forget the lesson of medical history, that the man on the spot nearly always blames the constitution, whereas the environmental factor is found by the stranger who gets a detached view. Local doctors with experience of the post-war epidemics of scurvy in Russia or of rickets in Austria, together with commissions which have studied pellagra and other diseases, have been impressed by the fact that the incidence of these diseases did not fit a simple dietary hypothesis (György and Stepp 1927, Illinois pellagra commission 1912, Sambon 1910). It was only because of the geographical distribution of these diseases and their fluctuating incidence that it could be assumed with certainty that external factors were important.

The clinician does not see the importance of external factors in disease, because disease, as he sees it in daily practice, is not caused, sensu stricto, by external factors but by constitutional susceptibility. Caries of the teeth is an example of this. There is good evidence of its sudden appearance in communities after changes in diet (Pedersen 1937 and others). There is geographical evidence of huge local variations in incidence (cf. French and German figures on the teeth of army conscripts from different parts of the country). If anyone doubts the importance of heredity, he need only examine a series of twins to convince himself of the extraordinary resemblances in identical twins as compared with fraternal twins. Even on a bad diet a few people, thanks to their heredity, may have perfect teeth, whereas even on a good diet some people will have bad teeth. But in any community which comes under a single observer the range of diet tends to be less important than the range of heredity; hence, if patients with good teeth are compared with patients with bad teeth, differences in feeding habits are uncertain, whereas family differences in liability to caries are usually definite.

Diseases of the digestive apparatus have the same sort of incidence as caries. Clinically, heredity and constitutional type seem important; but geographical variations exist (Somervell and Orr 1936, Odin 1937), although they are difficult to prove, because diagnosis is so much a matter of opinion that variations in incidence must be very large before they are convincing. Historical variations exist, but here again they cannot be proved from figures of uncomplicated ulcers, which are influenced by changes in hospital organisation, diagnostic fashions, and so on. The diagnosis of acute perforations, on the other hand, is not a matter of fashion; either there is an operation or the patient dies.

For this study all readily available papers on acute perforations have been examined, besides a mass of unpublished material in England and abroad. As a result, it is possible to summarise for the first time the persuasive evidence that distinct groups of ulcer cases exist; that their incidence varies independently; and that the present common type of pyloric ulcer was relatively uncommon up to recently, and that its increase is a true increase and not merely the result of better diagnosis and hospital services.

FALLACIES IN COLLECTING MATERIAL

The numerous sources of information from which a history of perforated ulcer can be constructed are all open to criticism, because published material is a selected sample, selected by factors which it is difficult to evaluate. In the early 19th century the habit of the routine necropsy grew, and statistics from hospitals and pathological institutes exist for many parts of Europe; but transport was difficult, and for this and other reasons patients with perforation who died in hospital and came within the system were far from representative. Cases seen in private were described at meetings and in journals, but these cases reflect the practice of the rising Mayfair doctor rather than that of his colleague in the slums, and the post-mortem verification which was insisted on by the spirit of the times led to selection, for it was and is easier to get a necropsy on elderly or unattached patients than on adults in early middle life surrounded by their friends. About 1890, when it was realised that surgery gave a chance of recovery,

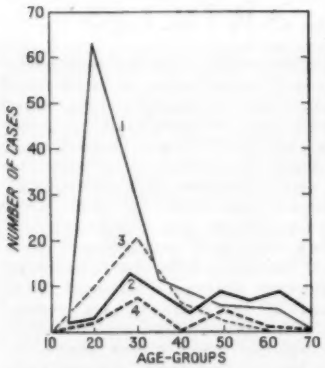

FIG. 1—Age-incidence (in age-groups) of perforated ulcer in males and in females: 1, females, and 2, males (Brinton 1857); 3, females, and 4, males (Moynihan 1907). Brinton's figures are divided into seven-year age-groups and those of Moynihan and other English surgeons into ten-year age-groups.

probably over-represented. Between 1900 and 1910 diagnosis and transport improved; this certainly affected total admissions to hospital and may have affected their age-incidence and sex-distribution. The 1914–18 war upset statistics, and since that period changes in organisation have taken place, especially in England and America, which make it impossible to compare one hospital with another in the absence of local knowledge. A final difficulty is that emergency surgery may be done by surgeons with little experience, and the subdivision of figures according to the localisation of the ulcer at operation is almost invariably incomplete and inaccurate.

These are the main difficulties in compiling a history of perforated ulcers. If we accept the modern swing of the pendulum—that figures which are possibly fallacious are probably fallacious—not only the history of perforated ulcer becomes impossible but also all other history. The justification for the views presented below is the very large number of independent sources of information which agree and the fact that everywhere where the hypothesis can be tested corroboration is found.

Perforated Ulcer before 1830

The clinical picture of perforation was easy to recognise: sudden agonising pain, board-like rigidity of the abdominal wall, and in most cases collapse and death within twenty-four hours. How did the many fine 18th-century physicians miss such a striking clinical picture, if it was as common then as it afterwards became in the 19th century? Albertus (1725) mentioned it in his forensic medicine as a rare cause of sudden death, important because it had to be differentiated from poisoning; whereas a hundred years later it was described as unmistakable and a common cause of early death. Morgagni (1769) described a definite perforation, and his remarks suggest that it was rare. The considerable early literature is not worth reviewing in detail, for references are difficult to verify and when found are usually only post-mortem accounts of holes in the stomach with food in the peritoneal cavity, unconvincing because the authors seem uncertain of the distinction between ante-mortem and post-mortem events, and clinical details are lacking. Instead of causing death, perforation may be followed by spontaneous gastric fistula, and several such cases were recorded in the 19th century; but in the 18th century, although gastric fistulæ attracted interest over a very wide area, few were reported (Murchison 1858). In the absence of intimate knowledge of prevailing medical conditions, arguments of the rarity or otherwise of a disease are of little interest, but they serve to introduce the period of more exact knowledge which begins with Gerard's (1803) paper.

Gerard, who was professor of medicine in Paris under the new republic and from his style of writing gives the impression of being a competent man, said that a knowledge of the clinical features of perforation was traditional in his family. He mentioned eight

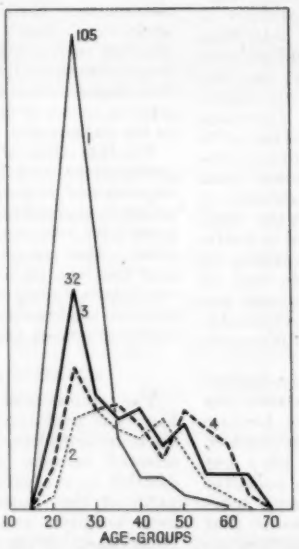

FIG. 2—Age-incidence (in five-year age-groups) and sex-distribution of 361 perforated ulcers in 1890–1903 (Brunner 1903) and 244 in 1903–11 (Schoemaker 1915): 1, females, and 2, males (Brunner); 3, females, and 4, males (Schoemaker). Schoemaker's figures are multiplied by 1·5 to bring them to the same scale as Brunner's. (These curves are drawn to five-year periods although only ten-year intervals are marked on the graph).

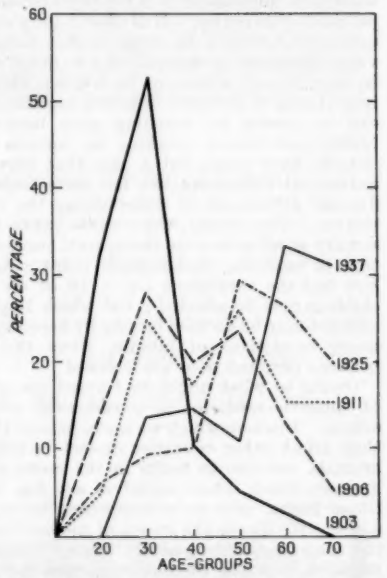

FIG. 3—Age-incidence (in ten-year age-groups) of perforated ulcers in females, showing gradual change since 1900: 1903 curve from Brunner (1903); 1906 curve for Berlin from Brentano (1906); 1911 curve for Sweden from Petren (1911); 1925 curve for Sweden from Bager (1929); 1937 curve for London from Boggon (1937). The percentage is that of perforations in each decade of a standard female population in which all age-groups are equally represented.

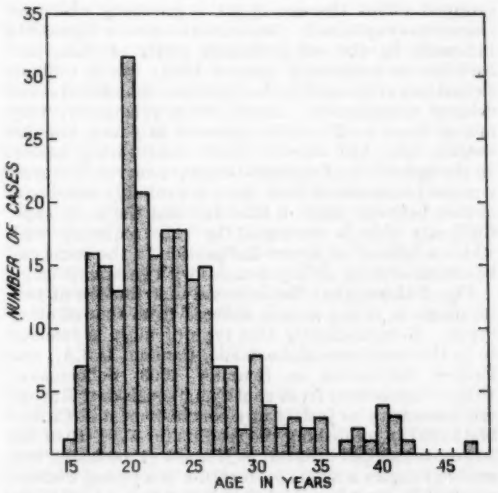

FIG. 4—Age-incidence (for each year from 15 to 45) of perforated ulcer in females. From data of Brunner (1903).

dubious cases from the literature, four cases which were almost certainly carcinomatous, and five definite cases of perforated ulcer; three in males aged 28, 45, and 50, and two in females aged 18 and 40. It took fifty years to collect these few perforations, the proportion of probably malignant ones is high, and there is only one certain case in a young woman. A few years later, in London, Travers (1816) had only seen two cases of perforated ulcer and had a third described to him. Nevertheless he gave a magnificent clinical description worthy of his acumen, and we cannot disregard his opinion when he calls the condition rare and unmistakable. Abercrombie (1830), of Edinburgh, reported five cases: four of them in women, and three out of the four women were under 21. He did not suggest that young women were especially liable.

IN YOUNG WOMEN

Within the next few years accounts of perforation became common. Country practitioners found perforated ulcer in young women, which "swept away beautiful and healthy creatures within a few hours," one of the most tragic experiences of their lives. Müller (1860) declared that it was an experience which no doctor could hope to escape. THE LANCET (1837–38), commenting on a case of Crisp's, wrote:

> "This case Mr. Crisp considered of importance in a medicolegal point of view. Four cases of a similar kind had happened in his neighbourhood within a few years. All of these cases occurred in young girls in whom there was a disordered state of the uterine function. The ages of two of these patients were 15, one was 16 and another 20 years of age; in all of them the stomach was perforated near the cardiac orifice. Death took place in 16, 17, 27, and 36 hours. Sixteen other cases of this kind he had found on record, fourteen of them occurring in females, one only of whom was married; and in most of them irregularity of the uterine function existed."

Pritchard (1842–43) also expressed the conviction that these cases in young women, so similar in age and previous good health, must be traced to one cause, reflex irritation from the uterus. Cases in the male sex, he considered, were totally distinct, in that there was always a previous history and the site of the perforation was nearly always the pylorus. Other writers, both in England and on the Continent, held similar views, except for some difference of opinion on the previous good health of the female patients. Cases did occur in young women of leisure, but rightly or wrongly several authors considered it to be much commoner among women in unhygienic surroundings.

Brinton (1857) reviewed various scattered statistics and added his own material: 160 perforations in women and 74 in men; the age of 139 women is known and of 60 men. Fig. 1 shows the age-incidence and sex-distribution of this material, which agrees in all respects with some 90 cases (Crisp 1852) which I have verified out of the literature of that period and which Brinton possibly included. On the same graph are shown some figures for the first surgical years from 1895 to 1905, which were published at a discussion of the Medico-Chirurgical Society (Moynihan et al. 1907) and represent for the most part admissions to London hospitals. The sex ratio was the same in 1900 as in 1850; contrary to what is sometimes stated, there was no bias in the admissions to London hospitals of women or of young women either at that time or any other time in the last century. The apparent increase in the age of the youthful group of female patients with perforations between 1850 and 1900 is partly (but not altogether) an artefact due to Brinton's cases being arranged in seven-year periods, whereas the later cases are arranged in decades.

After Brinton, references in the literature to perforated ulcer become rare and apologetic. There was nothing new to say, and Leube (1876) summed up the prevalent attitude by describing euthanasia as the only treatment. Such a remark, coming from such a well-known gastro-enterologist, produced rapid results, and clinicians were persuaded to trust their cases to surgeons. Mikulicz (1885) credited himself with the first attempt at suturing a perforation, in 1880, but the patient died; and, until Heussner performed the first successful operation on a patient of Kriege (1892), surgeons outside Germany had few opportunities. By 1895 recoveries became commonplace, especially in England, where the importance of early operation was quickly learnt. The medical journals about 1900 are a mine of information.

Fig. 2 is drawn from Brunner's (1903) survey of the world literature (361 cases) and from Schoemaker's (1915) collected data for 1903–11 (244 cases). Between these two

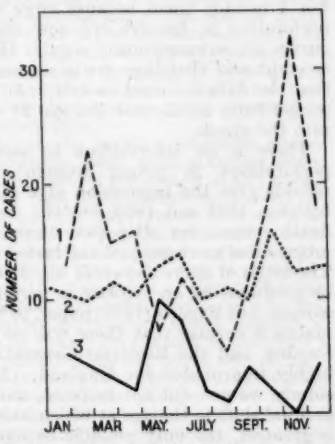

FIG. 5—Seasonal distribution of perforated ulcers: (1) perforated ulcers in females aged 15–30 (Brunner 1903); (2) perforated ulcers of all types (Bager 1929). Bager's figures are divided by 10 to bring them to the same scale as Brunner's; (3) perforated duodenal ulcers (Brunner 1903).

papers the sex ratio dropped from 2 : 1 to 1 : 1, and the same change can be found in all statistics of that period; young women are relatively fewer in the later series, but the age-incidence in males is probably unchanged. It is true that the 1903 material contains few cases of either sex over 60, but this is because the mortality of operation was greater in the higher age-groups and the surgeons, who were fighting to wrest abdominal emergencies from the physicians, disliked advertising failures.

To compare data from different countries and periods and to reduce errors due to variation in the age-incidence and sex-distribution of the populations and to our ignorance of the absolute risk of perforation, the following method has been adopted. The number of perforations in each age-group is divided by the total number of that age and sex living in the country at that time; the quotients are added together, and the quotient for each age-group is expressed as a percentage of the result. These percentages are then plotted to show in a curve the relative liability to perforation in each age-group of an imaginary population with equal numbers of each age and sex. The method is rough but probably as good as any other. An unavoidable fallacy is that the population served by any given hospital may not have the same age-distribution as the country as a whole. Luckily, judging from the sort of variation which is found in English towns and London boroughs, the difference at ages 20–60 is never sufficient to alter the form of the curve significantly.

Fig. 3, constructed in this way, shows how consistently the distribution of perforations in females in the different age-groups has changed. In 1856 and 1903 the liability in youth was so great as to make the later risk negligible, whereas by 1925 and 1938 the reverse is true and the early risk negligible. Petren's (1911) figures for south Sweden and Brentano's (1906) for Berlin are intermediate, either because they represent a transition stage, or because perforated ulcer in young women was never so common on the Continent as in England. Probably both explanations contribute to the form of the curve. Boggon's (1937) cases of perforation in females are too few to be significant, but I include them because large series of cases of perforation in females are now unobtainable. The curves are so suspiciously regular that it is necessary to emphasise that they are in no way "cooked," and that the data are random sets. All statistics of that period from north-west Europe fit equally smoothly into the graph.

There is no information to show exactly when perforations in young women ceased. Hospital records give the impression of a rather abrupt stop between 1905 and 1910, but the Registrar-General's death returns for all peptic ulcers suggest that the process was more gradual and lasted till 1920 (fig. 12). The types of curve shown in fig. 3 could equally well be produced by an increase in perforations in elderly women, but Bager's (1929) paper, to be discussed later, makes it certain that there was no such increase in Sweden, and the Registrar-General's figures make it highly improbable for England. If perforations in elderly women did not increase, and if there was no gradual shift in the age at which liability to perforate is greatest, the only possible explanation left is the accepted one that these cases in girls formed a discrete group which must have been due to something in the mode of life, for it certainly disappeared at the beginning of this century very suddenly and possibly increased almost equally suddenly at the beginning of the 19th century.

Fig. 4 shows how closely these perforations were grouped about the age of 20, a grouping which no theory has explained. An endocrine factor is possibly indicated by the extraordinary rarity of these perforations in pregnancy (Szenes 1923). It is difficult to find any references in the literature which will stand critical examination. Apart from pregnancy, very few of these perforations occurred in young married women who had started their childbearing career. In the light of the Registrar-General's curves, however, it must be admitted that there is probably some connexion between ulcer in later life and the early type. Clinically this is confirmed by the frequency with which a history of severe indigestion in the teens can be obtained from elderly females with gastric ulcer.

Fig. 5 shows that the seasonal distribution of perforations in young women differed from that of other types. Geographically this type of ulcer is referred to in the literature of Australia, Canada, U.S.A., and France (references in Brunner 1903, Schoemaker 1915). Acccounts from south and south-east Europe are too scanty to justify any conclusions, and Citronblatt (1912), publishing the records for 1901–10 of the largest municipal hospital in Moscow (1200 beds), was unable to trace a single perforation in a young woman, nor had he ever heard of that type of case in Russia.

(*To be concluded*)

THE B.L.B. MASK FOR ADMINISTERING OXYGEN

BY

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CONSIDERABLE attention has been paid to the design of masks for the administration of oxygen, and many new forms have been suggested. Christie (1938) describing a new nasal mask pointed out that it was efficient, comfortable, and inexpensive, and that the alveolar oxygen in healthy individuals could be maintained at about 42 per cent. with an oxygen flow of 3 litres a minutes and 52 per cent. with 5 litres a minute. These results have been confirmed in individuals when breathing through the nose, but the alveolar oxygen is lower when breathing is carried out through the mouth.

In the same year (1938), Boothby, Lovelace, and Bulbulian described a new inhalation apparatus which was similar in many respects to Christie's nasal mask. This "B.L.B." mask has, however, several advantages: (1) by its use any desired concentration of oxygen between that in air and practically pure oxygen can be administered; (2) the apparatus is comfortable and can be worn for long periods without difficulty; (3) the mouth is free for feeding and talking; and (4) the apparatus is mechanically simple and easy to operate, which permits of its extensive use in medical and surgical cases. This inhalation apparatus was designed originally for the use of aviators; from this standpoint it has been subjected to severe tests, and now it forms part of the pilot's equipment on the commercial American air lines.

CONCENTRATION OF OXYGEN

Boothby (1938) has pointed out that the ability to administer with ease and certainty high concentra-

tions of oxygen with this apparatus permits investigations to be made of the effects of a considerable increase in the oxygen tension of the arterial blood on various clinical conditions. The exposure of the blood in the capillaries of the lungs to high partial pressures of oxygen will increase the oxygen tension and content of the arterial blood. The concentration of oxygen in the alveolar air is normally about 14 per cent. The total pressure exerted by all the gases in the alveolar air is equal to the atmospheric pressure (760 mm. Hg). Alveolar air is saturated with water vapour at 37° C. which exerts a pressure of 47 mm. Hg ; the pressure of the dry gases (O_2, CO_2, N_2) is consequently 760−47=713 mm. The partial pressure of oxygen in the air sacs of the lungs would therefore be approximately 100 mm. Hg—

$$\frac{14}{100} \times \frac{(760-47)}{1} = 99{\cdot}8 \text{ mm. Hg}$$

Since the tension of oxygen in the arterial blood is 5–10 mm. Hg below that in the alveolar air, the arterial oxygen tension is 90–95 mm. Hg. When the concentration of oxygen is increased in the alveolar air and the pulmonary blood is exposed to high partial pressures of the gas, the arterial oxygen tension is increased—e.g., when the alveolar oxygen reaches a concentration of 90 per cent., the tension of the gas in the arterial blood amounts to about 600 mm. Hg.

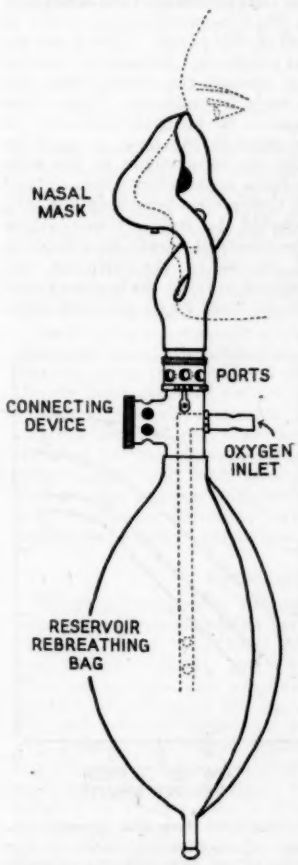

FIG. 1—The B.L.B. inhalation apparatus.

The hæmoglobin capacity of 100 c.cm. of blood can be taken as 20 c.cm. of oxygen when completely saturated, but under ordinary conditions it is 95–96 per cent. saturated. Therefore 100 c.cm. of blood would contain about 19–19·2 c.cm. of oxygen combined with hæmoglobin and 0·3 c.cm. of oxygen in solution, a total of about 19·5 c.cm. When, however, the blood in the capillaries of the pulmonary alveoli is exposed to high partial pressures of oxygen, as when the oxygen in the alveolar air is 90 per cent., the hæmoglobin is almost completely saturated, and the amount in solution is about 2 c.cm. per 100 c.cm. The arterial blood then contains 22 c.cm. of oxygen, an increase of about 10 per cent. We do not intend to discuss the value of administering high concentrations of oxygen in clinical work, but we point out that beneficial effects from this form of therapy are claimed in conditions of shock and abdominal distension. It has been commonly taught that greater concentrations of oxygen than 60 per cent. in the alveolar air may be harmful, owing to the possibility of causing inflammation in the lungs. At the Mayo Clinic, however, oxygen in high concentrations has been administered to many patients for one to four days with intermissions of a few minutes every three or four hours without any evidence of pulmonary irritation (Boothby 1938).

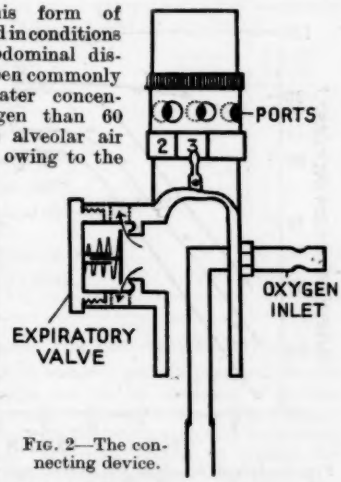

FIG. 2—The connecting device.

APPARATUS

The original papers describing the B.L.B. mask have probably not come to the notice of many medical men in this country ; the apparatus is therefore described here. It consists of three parts : (1) the mask and (2) the connecting device which joins the mask to (3) a reservoir-breathing bag (fig. 1).

(1) Two types of interchangeable rubber masks have been designed : (*a*) a nasal type which leaves the mouth free, and (*b*) an oronasal type which meets the requirements of cases in which adequate breathing through the nose is impossible. All normal adults can be fitted with one or other of the two sizes, small and large, of each of these two types. The nasal mask is provided with two hollow tubes which pass on each side of the mouth and unite over the lower part of the chin into a single tube. These tubes are in open communication with the rubber bag at all times through the connecting device. The mask is held in position on the face with an adjustable rubber strap, which is placed above or below the ears according to the comfort of the patient. Slight adjustments to the shape of the mask may be made by bending the malleable strips. A small hole is provided at the base of the nasal mask for the insertion, when required, of a gastric or a duodenal tube.

(2) On the side of the metal connecting device (fig. 2) is an expiratory valve with a spring under slight tension, which permits the escape of any excess of expired air above that just sufficient to distend the bag, without causing any appreciable resistance to expiration. On the other side of the connecting device is an inlet connected with the oxygen cylinder ; the oxygen enters through this inlet and is delivered through a tube into the lower part of the rubber bag. The upper part of the connecting device is provided with an air-regulating mechanism which consists of three small holes or ports, over which is mounted a rotating sleeve with three similar ports, one or more of which may be brought into operation by turning the sleeve. If desired, all the ports may be closed.

(3) The rubber bag, which is similar to a football bladder, has a capacity of 730–800 c.cm. When the apparatus is in use with all the ports closed, the first part of the expired air passes from the mask through the connecting device into the rubber bag, where it is mixed with the incoming oxygen. When the bag becomes distended, the slight pressure then produced permits the excess of expired air to escape through the expiratory valve. On inspiration the expiratory valve closes and the oxygen and expired air pass

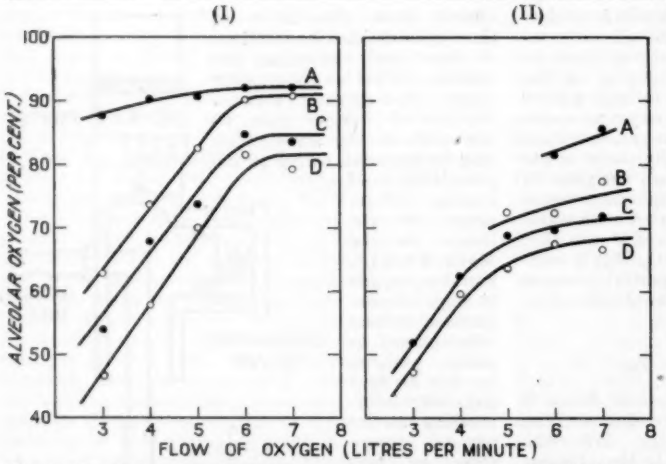

FIG. 3—Graph to show the percentage of oxygen in the alveolar air obtained in normal persons with different tidal airs. The points represent averages of several determinations. A, no ports open; B, 1 port open; C, 2 ports open; D, 3 ports open. (I) tidal air = 297 c.cm. (II) tidal air = 550 c.cm.

from the bag through the connecting device to the mask. By adjustment of the air-regulating mechanism different amounts of atmospheric air are mixed with oxygen in the inhalation apparatus. If concentrations of 80–90 per cent. of oxygen are required in the alveolar air, the apparatus must be used with all the ports closed. The flow of oxygen should be adjusted so that the bag does not collapse completely before the end of inspiration, for under these conditions the patient obtains all his inspired air from the bag. If lower concentrations of oxygen are required, one or more ports are uncovered and the patient breathes from the bag and the atmosphere.

TABLE I—PHYSICAL DATA REGARDING SUBJECTS OF TESTS

Subject	Sex	Age	Weight (kg.)	Height (cm.)	Vital capacity (litres)	Respiration-rate (per min.)	Tidal air (c.cm.)
1	M	45	76·4	177	4·0	11	461
2	M	42	63·6	182	4·4	15	466
3	M	31	71·4	187	5·6	13	550
4	F	30	74·5	177	3·9	11	488
5	F	24	50·9	157	3·3	19	297

EXPERIMENTAL RESULTS

An attempt has been made to obtain with this apparatus information about the concentration of oxygen in the alveolar air and the composition of gases in the bag and inspired air under different conditions. Our observations were made on 5 normal people: 3 male and 2 female. Their physical characters differed widely, as shown in table I. The experiments were usually carried out at least three hours after food. The subject lay on his back for 15–30 min. At the end of this period the mask was fitted to the face and the oxygen flow adjusted. After administration of oxygen for 15 min. the mask was removed on a signal and the expiratory alveolar air sample collected in an evacuated sampling tube by the Haldane-Priestley method. Air analysis was carried out in a small or large Haldane gas-analysis apparatus. The subjects were trained to give alveolar air samples, and care was taken that the respirations during the preceding few minutes were natural. If on examination it was found that the percentage of carbon dioxide was below that of the normal alveolar air, another sample was collected.

Several observations have been made on each subject. For any given flow of oxygen subjects with a small tidal air had a higher percentage of oxygen in the alveolar air than subjects with a large tidal air (fig. 3). The average percentage of oxygen obtained in the alveolar air of the five different subjects with different flows of oxygen is shown in fig. 4. This graph shows that the percentage of oxygen in the alveolar air can be varied according to the flow of oxygen per minute and the number of ports open. With the ports arranged as shown in table II, concentrations of 45–90 per cent. of oxygen can be obtained in the alveolar air. It must be emphasised that these figures are average figures obtained from five normal subjects. The percentage of oxygen in the alveolar air may vary in any subject about ± 5 per cent. from these percentages.

It may be contended that deliberate nose-breathing is necessary to obtain the concentration of oxygen in the alveolar air claimed in this paper. This is not so. In our experience most people find it easier to breathe through the nose than through the mouth when the mask has been in use for a few minutes. Even with sick people there appears to be little difficulty in administering oxygen through the nose, as may be judged from observing the movements of the bag. If the patient suffers from nasal obstruction or any other condition which makes nose-breathing difficult, the oronasal mask should be used. Observations have been made on the effects of mouth-breathing on the concentration of oxygen in the alveolar air. Deliberate mouth-breathing lowered the percentage of oxygen in the alveolar air from 90 to approximately 50 per cent.

It is often observed that the ventilation of the subject was increased, particularly when oxygen was administered with the three ports closed; increasing the flow of oxygen per minute decreased the depth of breathing. Since this effect could only be due to carbon dioxide, it was decided to analyse the contents of the bag at the

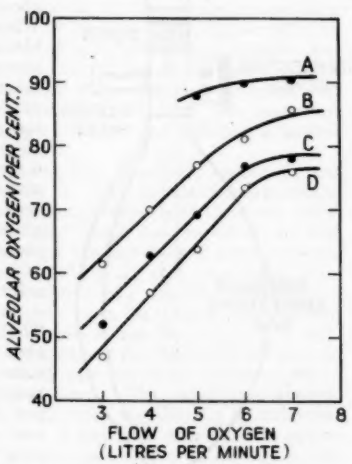

FIG. 4—Graph to show the average percentage of oxygen obtained in the alveolar air of five different subjects (table I) with different flows of oxygen; A, B, C, D, as in fig. 3.

end of expiration. The experiments were carried out as follows :—

The subject lay on a bed for a preliminary rest of 15 min. After oxygen had been administered for 30 min., a sample was collected from the middle of the bag at the end of expiration. Immediately before the sample was taken, the oxygen-inflow tube was clipped and the bag tied off. These figures have been included with the figures for alveolar oxygen in table II.

On examination of samples of inspired air taken from the mask through the small hole immediately under the nose, it was found that at the beginning of inspiration the samples had a higher content of carbon dioxide than that in the bag at the end of expiration, owing to collection of expired air in the tubes of the apparatus. Samples of inspired air collected about the middle of inspiration were similar in content of carbon dioxide to those taken from the bag. The content of carbon dioxide in samples taken

TABLE II—EFFECTS OF OPENING PORTS

Flow of oxygen (litres per min.)	Ports open	Oxygen in alveolar air (%)	Carbon dioxide in bag (%)	Flow of oxygen (litres per min.)	Ports open	Oxygen in alveolar air (%)	Carbon dioxide in bag (%)
3	3	46	2·04	6	0	87	1·42
4	3	56	1·51	7	0	90	0·99
5	2	69	1·22	8	0	91	0·39
6	2	76	0·89				

towards the end of inspiration was lower than that found in the bag. We may conclude, therefore, that the figures given for carbon dioxide in the bag at the end of expiration are higher than the average percentage of carbon dioxide in the inspired air.

The oxygen in the inspired air has also been estimated. It has been shown that the percentage of oxygen in the alveolar air is approximately 7 per cent. below that of the inspired air, even when the inspired air contains a high percentage of oxygen. It is therefore of interest to note that, when all the ports are closed, so that the air in the bag is not mixed with atmospheric air, the percentage of oxygen in the bag and in the "middle inspiratory sample" approximate closely and are about 7 per cent. higher than the figures obtained for the corresponding alveolar air. If the apparatus is used with several ports open, the air from the bag is mixed with atmospheric air, and there is a considerable difference between the oxygen in the middle inspiratory sample and that in the bag.

DISCUSSION

We do not propose to discuss the different methods which have been suggested for the administration of oxygen. These have been described by Campbell and Poulton (1938), and Christie (1938) reviews their advantages and disadvantages. The concentrations of oxygen in the alveolar air obtained with different forms of apparatus are shown in table III. Fig. 3 shows that higher concentrations of oxygen in the alveolar air can be obtained with the B.L.B. apparatus using 3 litres of oxygen a minute and either 1 or 2 ports open instead of 3. The use of 3 ports with a flow of 3 to 4 litres of oxygen a minute has been suggested because, even when the depth of ventilation is considerable, there is little or no resistance to breathing.

TABLE III—CONCENTRATIONS OF OXYGEN IN THE ALVEOLAR AIR WITH VARIOUS TYPES OF APPARATUS

Apparatus	3 litres (%)	5 litres (%)
Haldane, new pattern	54	70
Nasal mask (Christie 1938)	42	52
Nasal catheter (Christie 1938) ..	32	—
Forked tubes (Christie 1938) ..	31	40
Funnel held tight against face (Christie 1938)	25	33
Tudor Edwards catheter carrier ..	25	33
B.L.B. apparatus { 3 ports ..	47	—
B.L.B. apparatus { 2 ,, ..	—	70

INSTRUCTIONS FOR USE OF APPARATUS

It is important to observe certain practical details if successful results are to be obtained with this method. The nursing staff responsible for the therapy should be familiar with the apparatus and have worn the mask, so that they may be able to explain the procedure and obtain the confidence of the patient.

After the apparatus has been assembled, the flow of oxygen should be adjusted to about 7 to 8 litres a minute and the mask fitted on the face. The patient should then be asked to breathe through the nose for 2–3 min., and during this period the apparatus should be tested for leaks by pressing the mask on the face. If the bag distends to a greater extent during this procedure, oxygen is probably escaping. The strap should therefore be shortened and the shape of the mask adjusted.

When the apparatus is being used with the 3 ports closed, the oxygen requirements of the subject can be gauged by observing the bag, which must not be allowed to collapse completely before the end of inspiration. If the patient, after wearing the mask for 3–5 min., empties the bag, the inflow of oxygen must be increased. In practice it may be found more convenient to start with a high flow which can be cut down after the patient has adjusted himself to the apparatus. Under these conditions a flow-meter is not essential. If, however, one or more ports on the apparatus are used, a flow-meter must be included in the circuit. The inspired air is well moistened by the water vapour which has condensed in the bag and mask; indeed, after the apparatus has been worn for several hours, it may be necessary to take out the glass spigot at the end of the bag and remove the excess moisture. The oxygen need not therefore be bubbled through water before entering the apparatus.

When the mask is removed for nursing purposes, the bridge of the nose and the upper lip should be examined to ascertain that the mask has not pressed too tightly on the face. If the skin is marked, small strips of gauze should be placed under the mask to protect the face before it is refitted. If the pressure of the straps causes discomfort, pieces of gamgee tissue may be used as pads under them. When the mask is removed for any period, the pulse should be examined at intervals, and, if any change takes place, the mask should be replaced immediately.

To sterilise the apparatus, the mask and the bag should be boiled for 5 min. and then dried. The connecting device can be sterilised in an antiseptic solution.* If it is necessary to open the valve, the connecting device must be held so that the oxygen-

* It is claimed that the connecting device may be sterilised by boiling. The tension of the expiratory valve spring was not diminished after the connecting device had been boiled for 3 hours and 30 min.

inflow tube points to the ceiling, when the screw-head on the valve may be loosened. To replace the valve, the spring must be laid within the screw-head and the upright of the aluminium disk placed in its seating. The screw-head is then tightened, the connecting device being held in the same position as was described for the removal of the valve.

We are indebted to the Surrey County Council for arranging laboratory facilities. Dr. Forest Smith and Prof. McSwiney express their thanks to Dr. C. Mayo and Dr. W. M. Boothby for the generous help given during their visit to the Mayo Clinic. The expenses of this work were defrayed by a grant from St. Thomas's Hospital medical school.

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FAULTY DETOXICATION IN SCHIZOPHRENIA

ABNORMAL EXCRETION OF HIPPURIC ACID AFTER ADMINISTRATION OF SODIUM BENZOATE

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IT was reported by us (Quastel and Wales 1938), after an investigation of the excretion of hippuric acid following the administration of sodium benzoate by mouth to 67 psychotic patients, that catatonic patients as a class appeared unable to detoxicate benzoic acid at the normal rate. The average value of benzoic acid eliminated (as hippuric acid) in 27 cases of non-catatonic schizophrenic patients in four hours after oral administration of 6·0 g. of sodium benzoate was 3·4 g., a value agreeing well with that obtained by previous workers for normal persons without hepatic damage. The average value of benzoic acid eliminated (as hippuric acid) under the same conditions by 18 catatonic patients was 2·2 g. It was inferred that a metabolic disturbance in the liver affecting benzoic detoxication might be a characteristic feature of catatonic patients without obvious renal or hepatic damage. It was, however, pointed out that delayed absorption of benzoate or of glycine from the gut might be responsible for the phenomenon.

Ström-Olsen, Greville, and Lennon (1938) repeated this work with 62 schizophrenic patients, of whom 28 were considered to be catatonic. They found that only 5 of the catatonic patients gave abnormally low values of hippuric acid excreted, the proportion being about the same as among the non-catatonic schizophrenic patients. Such a finding seemed not to indicate any noteworthy difference between catatonic and other schizophrenic patients so far as the detoxication of benzoic acid was concerned, and it was not in agreement with our observations. There was agreement that a small but not insignificant proportion (6 out of 34) of non-catatonic schizophrenic patients without obvious renal or hepatic disturbance gave abnormally low excretions of hippuric acid under the standard test conditions.

FURTHER INVESTIGATION

The divergence between our results and those of Ström-Olsen et al., so far as catatonic patients were concerned, was so striking that we decided to repeat the work with the catatonic patients available in Cardiff City mental hospital. Our results with the technique already described by us (Quastel and Wales 1938) entirely confirmed our previous work. Each catatonic patient, clearly diagnosed as such at the time of the test, gave a value of hippuric acid excreted definitely less than the minimal value (2·9 g.) taken as normal. The values are shown in table I together with the values obtained on previous occasions. It is significant that 3 of the patients (cases 10, 11, and 12), previously found to give low values of hippuric acid excreted, on this occasion yielded increased values, and that the alteration of the rate of excretion coincided with improved mental condition following Cardiazol treatment in cases 11 and 12. One of these three patients (case 10) had a relapse and the rate of excretion of hippuric acid again fell. It seems, therefore, that the clinical condition of the patient at the time of the test may have an important bearing on the rate of detoxication of the benzoic acid. Possibly this factor may be partly responsible for the lack of agreement between our results and those of Ström-Olsen et al., so far as catatonic patients are concerned.

TABLE I—EXCRETION OF HIPPURIC ACID AFTER ORAL INJECTION OF SODIUM BENZOATE

Case	Sex and age	Date of examination	Clinical condition	Hippuric acid excreted (g.)	Equivalent benzoic acid (g.)
1	M. 45	24/xi/37	Catatonic (stuporose)	1·1	0·7
		17/i/38	Not improved	2·2	1·5
		4/xi/38	Not improved	2·5	1·7
2	M. 27	1/ii/38	Catatonic (stuporose)	2·7	1·8
		5/iv/38	Not improved	1·7	1·2
		4/xi/38	Not improved	2·7	1·8
		18/xi/38	Not improved	3·0	2·0
3	M. 34	4/ii/38	Catatonic (stuporose)	2·9	2·0
		11/xi/38	Not improved	3·1	2·1
4	M. 37	15/ii/38	Catatonic (stuporose)	2·9	2·0
		14/xi/38	Not improved	4·2	2·8
5	M. 42	17/xi/38	Catatonic (stuporose)	3·4	2·4
6	M. 39	30/vi/38	Catatonic (excited)	2·8	1·9
		21/xi/38	Not improved	3·3	2·3
7	M. 34	3/xi/37	Catatonic (stuporose)	3·5	2·4
		3/ii/38	Not improved	4·0	2·7
		22/xi/38	Not improved	3·0	2·1
8	F. 18	8/xii/38	Catatonic (stuporose)	4·1	2·8
9	M. 38	3/xi/37	Catatonic (stuporose)	1·9	1·3
		7/xi/38	Not improved	4·1	2·8
10	M. 30	15/iii/38	Catatonic (stuporose)	1·8	1·2
		7/iv/38	Not improved	2·7	1·8
		31/x/38	Improved (less stuporose)	5·0	3·4
		23/xi/38	Relapse (excited)	3·7	2·5
		1/xii/38	Unchanged	4·0	2·7
11	M. 33	10/xii/37	Catatonic (excited)	3·7	2·5
		3/xi/38	Much improved (slight stupor)	5·1	3·4
12	M. 24	13/xii/37	Catatonic (excited)	3·55	2·4
		4/iv/38	Not improved	1·2	0·8
		16/xi/38	Much improved (slight stupor)	4·9	3·3

EFFECTS OF INTRAVENOUS ADMINISTRATION OF SODIUM BENZOATE

To overcome the possible objection that delayed absorption of benzoate from the gut might explain the low excretion of hippuric acid after oral admini-

TABLE II—EXCRETION OF HIPPURIC ACID AFTER INTRAVENOUS ADMINISTRATION OF SODIUM BENZOATE

Case	Sex and age	Diagnosis	Hippuric acid excreted (g.)	Equivalent benzoic acid (g).
1	M. 45	Catatonia	4·2	2·8
2	M. 30	,,	3·7	2·5
3	M. 27	,,	3·9	2·6
4	M. 37	,,	3·7	2·5
5	M. 39	,,	2·7 ; 3·8	1·8 ; 2·6
6	M. 37	,,	3·3	2·2
7	M. 36	Hebephrenia	5·0	3·4
8	M. 26	,,	5·8	3·9
9	M. 47	Dementia paranoides	5·9	4·0
10	M. 30	,, ,,	5·4	3·7
11	M. 39	Dementia simplex	4·0	2·7
12	M. 38	Paraphrenia systematica	6·3	4·3
13	M. 34	Schizoid mental defect	4·1	2·7
14	M. 45	Congenital ,, ,,	4·0	2·7
15	M. 17	Mental defect	6·5	4·4
16	M. 42	Chronic Mania	5·7	3·9
17	M. 22	Depressive stupor	5·7	3·9
18	M. 45	Anxiety-neurosis	5·8	3·9
19	M. 43	Manic-depressive	5·8	3·9
20	M. 24	Catatonia, much improved	5·2	3·5
21	M. 27	,, ,,	4·5 ; 5·1	3·1 ; 3·5
22	M. 27	Normal (medical officer)	5·9	4·0

stration of sodium benzoate, experiments were carried out in which sodium benzoate was given to the patient intravenously.

An intravenous injection of sodium benzoate 3 g. in 20 c.cm. of water was given to the patient at 8.30 A.M., and this was followed by another injection of sodium benzoate 3 g. in 20 c.cm. water at 9.30 A.M. Urine was collected, after emptying the bladder just before 8.30 A.M., during the whole period until 1 P.M. The patient's breakfast consisted of toast and coffee and was taken at 8 A.M. No food or drink was taken by the patient during the experimental period, and the patient was kept in bed. No untoward effect of the benzoate injection was noticed on the patient, but nearly all patients treated in this way had various degrees of diuresis.* There was never any necessity to catheterise the patient. The urine was collected and the hippuric acid estimated exactly as described in our previous paper (Quastel and Wales 1938).

Results with 21 patients showed that the rate of excretion of hippuric acid after intravenous administration of sodium benzoate was of the same order of magnitude as in patients who had taken the benzoate by mouth. Characteristic results are given in table II. Catatonic patients again show, as a class, a diminished ability to detoxicate benzoic acid, all but two of the yields of excreted hippuric acid falling below a value corresponding to 3 g. of benzoic acid. The exceptions are two patients (cases 20 and 21) who have shown much mental improvement—case 20 after cardiazol treatment. Among the non-catatonic patients the results vary ; 3 (cases 11, 13, and 14) out of 13 (cases 7–19) show abnormally low yields of hippuric acid. The cases are too few to allow more than a tentative generalisation, and results are required from hospitals with larger numbers of catatonic patients than are present here. It may, however, be concluded from the results shown in table II that the failure of the catatonic patients to detoxicate benzoic acid at the normal rate is unlikely to be due to a faulty absorption from the gut.

SUMMARY

(1) Repetition of our previous work (Quastel and Wales 1938) on the excretion of hippuric acid after oral ingestion of sodium benzoate has been carried out on 12 cases of mental disorder. The previous conclusion, that catatonic patients as a class show a diminished ability to detoxicate benzoic acid, has been confirmed. Improvement in the ability to detoxicate benzoic acid has been found in 3 catatonic patients who have improved mentally after treatment.

(2) Similar results have been found after intravenous injection of a solution of sodium benzoate. It is concluded that the lowered rate of excretion of hippuric acid among catatonic (and certain other psychotic) patients after oral ingestion of benzoate is not necessarily due to faulty absorption of benzoate from the gut.

Our thanks are due to Dr. T. J. Hennelly, medical superintendent, for his interest and permission to cite the cases, and to the Medical Research Council for a grant in aid of laboratory equipment.

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* Many of the patients commented on the taste of benzoate immediately after the injection.

FAULTY DETOXICATION IN MENTAL DISORDER

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Quastel and Wales (1938) measured the excretion of hippuric acid after the administration of sodium benzoate to psychotic patients, and as a result they suggested that "catatonics as a class show a definite disability to detoxicate benzoic acid at a normal rate" and inferred "that, in this subgroup of schizophrenia at any rate, there is present an abnormality which is concomitant with, and may be partly responsible for, the development of the psychosis." This suggestion is of sufficient significance to merit further work, a point which Quastel and Wales advocated, owing to the small number of true catatonics to which they had access. Ström-Olsen, Greville, and Lennon (1938) repeated the above investigation but were unable to substantiate the findings fully. In our work, however, it has been possible to confirm the results of Quastel and Wales, for out of our group of 17 catatonics 15 did not detoxicate benzoic acid at a normal rate.

CHOICE OF PATIENTS AND TECHNIQUE

All the patients selected for this investigation showed no disorder of either renal or hepatic function. Several showed impaired circulation of their extremities and various degrees of nutrition. Of the 75 patients investigated 45 were schizophrenics, of whom 17 were typical catatonics, the diagnosis being confirmed by the independent examination of at least three medical officers. Several of these patients had received convulsion therapy with either Cardiazol or Triazol at various times in the year. Provided no remission took place this did not appear to affect the result of the test. The technique of the test was identical with that of Quastel and Wales (1938).

RATE OF EXCRETION OF HIPPURIC ACID IN NORMAL PEOPLE

The rate of excretion of hippuric acid, both by normal people and by patients with hepatic or renal disease, has been the subject of papers by Kohlstaedt and Helmer (1936), Quastel and Wales (1938), Quick

(1932, 1933), Snell and Plunkett (1935–36), and Vaccare (1935). There seems to be a fairly consistent agreement between all workers that the lower limit of excretion among normal controls is 4·5 g. of hippuric acid—the equivalent of 3·0 g. of the originally ingested sodium benzoate. This figure agrees closely with that chosen by Quastel and Wales—2·9 g. of sodium benzoate—as the one below which excretions may be judged abnormal.

TABLE I—EXCRETION OF HIPPURIC ACID AFTER ORAL INGESTION OF SODIUM BENZOATE

A.—SCHIZOPHRENICS

Case	Sex and age	Equivalent of benzoic acid excreted
Catatonics		
62	M. 27	3·4, 3·8
68	M. 23	3·1, 3·3
61	M. 30	2·1, 2·3
64	M. 27	2·8, 2·8
65	M. 27	2·1, 2·5
66	M. 25	2·6, 2·2
52	F. 31	2·9, 2·7
54	F. 32	2·0, 2·4
56	F. 24	2·9, 2·9
58	F. 19	2·1, 2·6
59	F. 31	2·6, 3·0
69	F. 31	2·7, 2·5
72	F. 26	2·8, 2·8
74	F. 30	2·8, 3·0
70	F. 32	2·6, 3·5*
71	F. 24	2·3, 3·0
73	F. 21	2·9, 3·5*
Non-catatonic		
8	M. 25	3·5
17	M. 24	3·9
48	M. 22	3·2
Non-catatonic (continued)		
49	M. 26	3·8
50	M. 37	3·3
29	M. 31	4·0
31	M. 42	3·4
34	M. 36	3·1
14	M. 32	3·8
32	M. 31	3·1
45	M. 45	4·2
33	M. 34	3·1
4	M. 30	2·4
18	M. 21	2·6
20	M. 20	2·6
28	M. 25	2·9
30	M. 40	2·4
35	M. 45	2·6
46	M. 38	2·8
63	M. 24	1·9
60	M. 40	2·7
76	M. 18	2·5
25	F. 27	3·7
26	F. 26	2·6
27	F. 25	2·9
57	F. 33	1·3
53	F. 40	1·8
13	F. 31	1·6

* The high figure was obtained during a remission.

B.—NON-SCHIZOPHRENIC

Case	Sex and age	Equivalent of benzoic acid excreted	Case	Sex and age	Equivalent of benzoic acid excreted	Remarks
Manic depressive			*Miscellaneous*			
6	M. 42	3·4	15	M. 24	3·8	Epilepsy
47	M. 37	3·9	21	M. 31	3·8	"
38	M. 43	3·0	67	M. 19	3·2	Mentally defective
16	M. 30	2·2	22	M. 54	2·8	Mania
17	F. 38	2·6	19	M. 71	2·0	Senile dementia
44	F. 66	2·9	75	M. 29	2·4	Hypomania
Melancholics			2	F. 29	3·6	Anxiety hysteria
7	M. 46	3·8	9	F. 39	4·0	Mania
36	M. 47	4·0	11	F. 15	3·8	Anxiety neurosis
37	M. 56	3·4	12	F. 14	3·6	Epilepsy
41	M. 59	3·8	1	F. 51	2·8	Mania
5	M. 35	4·0	10	F. 53	2·9	Hysteria
39	M. 31	2·0				
40	M. 69	2·3				
3	F. 49	3·8				
23	F. 55	3·1				
24	F. 46	3·6				
42	F. 55	3·6				
43	F. 62	3·4				

RESULTS

The complete results are given in table I. Of the 17 catatonics 13 gave results consistently below the lower normal limit of 3·0 g. of sodium benzoate. Others (cases 73 and 70) gave a low result followed by a high result, but with a high average; and the remaining 2 (cases 62 and 68) gave consistently high results. Purely by chance the present group of 17 catatonics contained 11 females. The normal figures quoted are mainly for males. Quastel and Wales (1938) and Ström-Olsen et al. (1938) investigated altogether 129 patients, who included only 26 females; hence, if there is a sex difference in the rate of excretion, our results may be unduly influenced by the large number of females included. Table II shows that there is little or no significant difference between the sexes in the amount of hippuric acid excreted as benzoic acid irrespective of clinical state, and it seems extremely unlikely that sex differences are responsible for the discrepancies between our results and those of Ström-Olsen et al.

TABLE II—EXCRETION OF HIPPURIC ACID ACCORDING TO SEX

Type of case	Sex	Authors: Quastel and Wales (1938) No. of cases	Quastel and Wales (1938) Average benzoic acid excreted (g.)	Ström-Olsen et al. (1938) No. of cases	Ström-Olsen et al. (1938) Average benzoic acid excreted (g.)	Davies and Hughes No. of cases	Davies and Hughes Average benzoic acid excreted (g.)
Catatonic	M.	16	2·2	20	3·4	6	2·7
	F.	2	2·0	8	2·9	11	2·7
Non-catatonic	M.	43	3·2	24	3·6	39	3·1
	F.	6	2·9	10	3·2	19	3·0

Details are given of 3 cases in which the results suggest that possibly the rate of excretion of benzoic acid under these experimental conditions may vary with the mental state of the patient.

CASE 70.—Female, aged 32, admitted on Jan. 2, 1939, with catatonic mania. The test was performed a week later, with a result of 2·6 g. of sodium benzoate excreted. During the next two months her clinical state improved greatly, and the test was repeated on April 6, two days before discharge, the result being 3·5 g. of sodium benzoate.

CASE 73.—Female, aged 21, admitted with catatonic mania within two days of case 70. The results of the tests were 2·9 g. of sodium benzoate on admission and 3·5 g. just before discharge.

CASE 71.—Female, aged 24, admitted with catatonic stupor. The initial test on admission, on March 2, 1939, gave a result of 2·3 g. She remained stuporose for about a month. A month later, when much

TABLE III—INCIDENCE OF FAULTY DETOXICATION IN MENTAL DISORDERS

Type of case	Authors	Patients examined	Patients with excretion of benzoic acid 3·0 g. or less	Average excretion of benzoic acid (g.)
Catatonic	Quastel and Wales (1938)	18	18	2·2
	Ström-Olsen et al. (1938)	28	5	3·3
	Davies and Hughes	17	15	2·7
	Total ..	63	38	
Schizophrenic (non-catatonic)	Quastel and Wales (1938)	27	4	3·4
	Ström-Olsen et al. (1938)	34	6	3·5
	Davies and Hughes	28	15	2·9
	Total ..	89	25	
Non-schizophrenic	Quastel and Wales (1938)	22	10	2·9
	Ström-Olsen et al. (1938)	—	—	—
	Davies and Hughes	30	11	3·2
	Total ..	52	21	
		204	84 (41%)	

improvement had taken place, the result of the test was 3·0 g. Two months later the patient was discharged. It was not convenient to perform the test in this case just before discharge.

There are too few cases in this research to justify any generalisation, but the suggestive nature of these results should not be overlooked. Although Quastel and Wales (1938) emphasised the possible significance of impaired detoxication in catatonia, they also appreciated the increased incidence of this impairment in other psychotic states. In table III the results of the three sets of workers have been grouped to show the incidence of impaired detoxication in psychotic states generally. Each set of workers has reported an increased incidence in every group examined. Quastel and Wales (1938) found 32 cases out of 67. Strōm-Olsen et al. (1938) described 11 cases out of 62, and we found 40 out of 75. Thus out of a total of 204 cases 84 gave low results—i.e., 41 per cent. exhibited evidence of impaired detoxication, with no clinical evidence of a known pathological condition to explain it.

COMMENTS

There seems to be little doubt that the detoxication of benzoic acid is much impaired in catatonia. There is equally little doubt that the phenomenon is not specific to this condition, although it is possible to demonstrate it far more readily in catatonic states than in any other mental condition. Faulty detoxication takes place more often in mental disorder than among normal people, and the implication follows at once that it is in many cases a concomitant of mental disease. Lack of knowledge of the mechanisms at work in the formation of hippuric acid in the body and the difficulties inherent in the present classification of mental patients make an accurate assessment of these findings extremely difficult. Consequently further work is necessary before the full significance of the results can be determined.

SUMMARY

(1) The excretion of hippuric acid after the oral administration of sodium benzoate has been examined in 75 cases of mental disorder, of which 17 were catatonic.

(2) The average value of hippuric acid excreted (expressed as sodium benzoate) by 58 non-catatonics was 3·1 g., and by 17 catatonics 2·7 g. Further, 15 out of 17 catatonics gave low results.

(3) These results confirm those of Quastel and Wales (1938).

(4) Of our 75 patients 40 gave low results, and of the 204 studied by the three sets of workers 84 yielded low results.

(5) From this it is inferred that the phenomenon is not specific to catatonia, although it may be a characteristic of this subgroup.

(6) Further work is needed before the significance of these results can be assessed.

We wish to thank Dr. D. R. Owen for permission to publish these results and for his interest in the progress of the work; our medical colleagues for access to their cases; and the nursing staff who helped us in the collection of specimens.

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ENDOMETRIOSIS OF THE BLADDER

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Although from the number of cases published endometriosis of the bladder appears to be rare, its true incidence has probably been masked in the past by wrong diagnoses. The first case was reported by Starr-Judd (1921); Reynolds (1939) has collected 34 cases, excluding his own; and Gregoire and Couvelaire (1939) have added another. The following are the main features of a case with which I was confronted.

CASE-RECORD

In 1937 I was asked to see a Chinese nullipara, aged 38, who complained of frequency of micturition, dysuria, and hæmaturia the day before menstruation. The pain was localised mainly to the urethral meatus. The symptoms reached a climax on the first day of the period and then subsided. The menses were scanty, and lasted for five days with an interval of twenty-four days. The patient had had three pelvic operations: a ventrosuspension in 1930, a left salpingo-oöphorectomy and partial resection of the right ovary in 1933, and an exploration of the pelvis in 1937 for a reason which she could not specify. Frequency and dysuria developed nine months after the second operation. Hæmaturia was an added symptom a few months before the third operation. During the intermenstrual intervals the patient was free from symptoms.

Cystoscopic appearance of endometriosis of the bladder a day before the onset of menstruation. O, orifice of right ureter.

On vaginal examination a hard irregular mass, about the size of a walnut, was felt in the uterovesical pouch on the right side. The fornices appeared to be normal on examination with a speculum. Cystoscopy revealed the typical picture of blue-black cysts and blue folds of œdema—"endometriotic œdema"—surrounding the right ureter (see figure). Cystoscopy was repeated during menstruation, but it was impossible to obtain a clear view owing to the hæmorrhage. At this time also the mass was larger and more tender on palpation.

Having diagnosed endometriosis of the bladder, I advised induction of the menopause with X rays, but the patient would not consent. That the diagnosis was correct has since been proved, for recently I have heard from the patient's doctor that her menses have ceased and her symptoms disappeared.

COMMENTS

The most comprehensive review of this subject in English is that of Phillips (1934). I had read his paper and remembered his impressive cystoscopic coloured plates. From the cystoscopic appearances and the clinical triad of cyclical frequency of micturition, dysuria, and hæmaturia accentuated at the period the diagnosis seemed beyond doubt. According to Phillips the blue folds of œdema, which he has described as "endometriotic œdema," are not seen

in any other disease of the bladder. Again, the blue-black cysts first described by Starr-Judd are pathognomonic.

Phillips found that in his series of 29 cases, 7 were diagnosed as carcinoma of the bladder. Other mistakes in diagnosis included perforated pyosalpinx, salpingitis, fibroids, papilloma of bladder, and appendix abscess. The diagnosis of endometriosis in situations other than the bladder is becoming more and more common. The bladder is not far from the uterus or ovaries; hence implantation of endometrium is easy. Several authors have attempted to differentiate between primary and secondary endometriosis of the bladder. The criterion of the primary endometriosis is that there is no demonstrable continuity with the uterus, fallopian tubes, or ovaries, and that there is no history of trauma to the vesical wall. The present case would therefore be one of the secondary type.

Treatment depends on whether the patient is approaching the menopause or not. If she is, X-ray therapy is the treatment of choice; if she is not and she desires children, resection of the bladder should be attempted, if anatomically possible.

In disorders of micturition in the female a full pelvic and urological examination is necessary because of the close proximity of the genital to the urinary tract. It is so easy to prescribe an alkaline mixture and to dismiss the patient without any attempt at diagnosis.

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ABSORPTION OF PROGESTERONE AND DESOXYCORTICOSTERONE

FROM TABLETS IMPLANTED SUBCUTANEOUSLY

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The method of administration introduced by Deanesly and Parkes (1937), by which pure hormones are implanted subcutaneously as dry crystals or compressed tablets, has now been extensively tested.

Schoeller and Gehrke (1938) found the technique highly effective for the administration of testosterone to capons, and Noble (1938) used it for investigating the biological properties of synthetic crystalline œstrogens. Where a very prolonged action of androgens or of œstrogens is required, as for the masculinisation of the female guineapig (Deanesly and Parkes 1938) or for the inhibition of the growth-promoting activity of the anterior lobe of the pituitary gland (Deanesly 1939, Noble 1939), the method is particularly convenient.

Bishop (1938) made the first clinical trial of the method by implanting an œstrone tablet for the relief of menopausal symptoms. Further clinical work has been carried out by Foss (1939), who made multiple implantations of œstrone or of œstradiol tablets, and by Salmon et al. (1939), who obtained very high effectiveness in relation to dosage by the implantation of crystals of œstradiol benzoate into menopausal women.

The increased effectiveness given by the method in the production of the ordinary effects of œstrogens is also seen in the production of their abnormal biological effects, particularly in the evocation of the growth of various kinds of tumours.

Pybus and Miller (1938) found that the implantation of 5 mg. tablets of œstrone into mice of a particular strain evoked multiple bone tumours earlier than did injection of the hormone. Twombly (1939) obtained a prolonged effect from the implantation of small crystals of œstrone, as a result of which carcinomata developed comparatively rapidly in susceptible mice. Lipschütz and Vargas (1939) obtained a similarly expedited production of myomata in rats by the implantation of tablets of œstradiol.

A novel use of the technique was made by Biskind and Mark (1939), who implanted tablets into the spleen to study the inactivation of testosterone and œstrone in rats.

The implantation technique appears to be particularly suitable for the administration of desoxycorticosterone.

Ingle and Mason (1938) showed that a concentrated extract of the suprarenal cortex was effective when administered in tablet form after admixture with cholesterol. Thorn, Engel, and Eisenberg (1939) kept supra-renalectomised dogs alive for an indefinite period by the implantation of tablets of desoxycorticosterone acetate. Subsequently Thorn, Howard, et al. (1939) showed that Addison's disease could be successfully treated in man by the same technique. Desoxycorticosterone acetate has also been successfully used by tablet implantation in the treatment of Addison's disease by Simpson (1939) and Dryerre (1939).

Attempts to use an implantation technique for hormones other than those belonging to the steroid group have not been very successful, though interesting results have been obtained by Parkes and Young (1939) for insulin and by Bottomley et al. (1939) for adrenaline. It seems likely that efficient administration of these hormones and other water-soluble substances by implantation of tablets will require the admixture of some relatively insoluble excipient.

PRESENT INVESTIGATIONS

We have made two further sets of experiments on the implantation technique. First, we have investigated the absorption of progesterone from tablets of substantial size. Apart from earlier observations of Deanesly and Parkes (1937, 1938), there seems to have been little consideration of the possibility of the parenteral administration of progesterone in tablet form, and data concerning the dosage which can be administered by the method will probably be of clinical interest. Secondly, we have considered the effect of acetylation of desoxycorticosterone on the rate at which it is absorbed from tablets. Esterification of œstrone or of testosterone with an aliphatic or similar organic acid leads to delayed absorption from the site of injection in oil solution, as, for example, in the well-known case of testosterone propionate. By analogy corticosterone acetate should be absorbed more slowly than the free substance, an expectation confirmed by the finding that the acetate was more effective when injected in oil solutions. As a result the acetate became the usual commercial form and was used for the experimental and clinical work on implantation recorded above. In the case of testosterone, the free hormone is absorbed from tablets, as from solutions, much more rapidly than the propionic ester. The results recorded below show that free desoxycorticosterone, as expected, is absorbed from tablets much more rapidly than is the acetate and may therefore be useful for the treatment of cases too acute to respond to the implantation of any reasonable amount of the acetate.

TECHNIQUE

The tablets of progesterone were made without excipient by compressing crystalline material in a hand tablet-making machine. The tablets were about 4 mm. in diameter and 1–3 mm. thick. The larger tablets of desoxycorticosterone were made in the same way. The tablets were implanted subcutaneously in the experimental animals, which were anæsthetised with ether. The tablet implanted in the woman was placed beneath the sheath of the rectus abdominis muscle. The tablets when removed were all hard and easily cleaned, dried and reweighed, except the five which were almost completely absorbed.

PROGESTERONE

The data are given in table I, which shows the duration of implantation, the amount absorbed from tablets of different sizes, and the percentage of each tablet calculated to have been absorbed per month (thirty days). The lowest rate of absorption (8·2 per cent. per month) was shown by tablet 1, implanted into a woman; but, since this same tablet, subsequently implanted into a goat, again showed a low rate of absorption (12·1 per cent.), it is unlikely that a genuine species difference is involved. Tablet 1 was the only one made from a particular batch of progesterone, and it may have had atypical properties. The remaining thirteen tablets all showed absorption-rates of 15–27 per cent. per month. Four tablets implanted first into a goat and then into a guineapig showed very similar rates of absorption in the two species, that in the guineapig being slightly lower, in spite of smaller size of the tablets. It is of interest that the calculated rate of absorption per month of tablets 2–6, which were almost completely absorbed in five months, was much the same as that for similar tablets left in the same animal for only one month. This apparent regularity of absorption throughout the life of the tablet is undoubtedly influenced by its disk-like shape. Tablet 1, for instance, weighing 23 mg. on removal from the goat, was very thin but only slightly less in diameter than when, weighing 85 mg., it was implanted into the woman 277 implantation days previously. If 20 per cent. per month is taken as the average rate of absorption, shown by the above results, it appears that a 50 mg. tablet will supply an average of 10 mg. a month for several months. Five such tablets would supply 50 mg. a month, a higher dosage than any likely to be required for long-continued therapy. The results published by Deanesly and Parkes (1938) for progesterone were obtained on small (3–5 mg.) tablets, which naturally showed a much higher percentage rate of absorption.

Comparison of these results with those previously published for other substances shows that progesterone is absorbed from tablets much faster than œstrone, œstradiol, or stilbœstrol; slightly faster than testosterone propionate; but more slowly than free testosterone.

TABLE I—ABSORPTION OF PROGESTERONE FROM IMPLANTED TABLETS

Animal	No. of tablet	Duration of implantation (days)	Weight of tablet (mg.)		Amount absorbed (mg.)	Percentage absorbed per month
			When implanted	When removed		
Man ♀	1	137	85	53	32	8·2
Goat ♂	1	140	53	23	30	12·1
	2	140	45	4	41	19·5
	3	140	50	2	48	20·5
	4	140	50	2	48	20·5
	5	140	50	4	46	19·7
	6	140	50	3	47	20·1
	7	30	40	30	10	25·0
	8	30	54	44	10	18·5
	9	30	59	46	13	22·0
	10	30	64	53	11	17·2
Guinea-pig ♀	7	70	30	13	17	24·3
	8	70	44	27	17	16·5
	9	70	46	28	18	16·8
	10	70	53	35	18	14·6
	11	53	57	36	21	20·9
	12	53	38	20	18	26·8
Rat ♂	13	30	57	42	15	26·3
	14	30	51	37	14	27·5

TABLE II—ABSORPTION OF DESOXYCORTICOSTERONE FROM TABLETS IMPLANTED INTO RATS

Substance	No. of tablet	Duration of implantation (days)	Weight of tablet (mg.)		Amount absorbed (mg.)	Percentage absorbed per month
			When implanted	When removed		
Desoxycorticosterone acetate	1	10	10·3	9·5	0·8	23·3
	2	10	12·0	10·8	1·2	30·0
	3	14	54	49	5	19·8
	4	14	42	36	6	30·0
	3	17	49	44	5	18·0
	4	17	36	33	3	14·7
Free desoxycorticosterone	1	14	51	35	16	67·2
	2	14	44	27	17	82·8
	1	17	35	26	9	45·4
	2	17	27	16	11	71·9

DESOXYCORTICOSTERONE

The data given in table II summarise experiments carried out with desoxycorticosterone and its acetate. They show that the free substance is absorbed from tablets two to three times as rapidly as the acetate. Two tablets of the free substance, weighing 44 mg. and 51 mg., both supplied more than 1 mg. daily for two weeks. On their reimplantation for a further seventeen days the amount absorbed naturally decreased; but, even so, the tablets supplied 28 mg. and 25 mg. over the total period of thirty-one days. Four 70 mg. tablets of the free substance would therefore supply a minimum of 4 mg. daily for a month, a higher dosage than appears to be obtainable by the implantation of any reasonable number of tablets of the acetate. Implantation of the free substance may therefore be useful when heavy dosage is required, but the rapidity with which even large tablets of the hormone in this form are absorbed would necessitate frequent implantations to avoid irregularity of dosage.

SUMMARY

(1) Progesterone is absorbed from large tablets implanted subcutaneously at an average rate of about 20 per cent. per month. Tablets weighing 50 mg. thus supply about 10 mg. per month.

(2) Free desoxycorticosterone is absorbed from implanted tablets more than twice as rapidly as desoxycorticosterone acetate.

We are indebted to Mrs. M. Boycott for information about the implantation of progesterone into the woman. The progesterone was supplied by Les Laboratoires du Dr. Roussel, and the desoxycorticosterone by Messrs. Ciba Ltd. and the Organon Laboratories.

References at foot of next page

MEDICAL SOCIETIES

ROYAL SOCIETY OF MEDICINE

SECTIONS OF COMPARATIVE MEDICINE AND EPIDEMIOLOGY

AT a combined meeting of these sections held on Feb. 21, Dr. C. H. ANDREWES, F.R.S., being in the chair, a discussion on

Salmonella Infections

was opened by a paper from Sir WILLIAM SAVAGE, read in his absence by Sir WELDON DALRYMPLE-CHAMPNEYS. The four especially interesting features of the salmonella group were (1) the organisms were all true parasites, (2) they did not occur as saprophytes anywhere outside the body, (3) they were not natural inhabitants of any animal intestine, (4) when found in animals they represented old infections and were examples of the carrier-state. The many types known were definite entities and not convertible into each other. If the salmonellas were regarded as true parasites their control was a straightforward, though still a difficult problem. The nomenclature and classification had been simplified by recent workers, notably White and Kaufman. More than forty types were recognisable; the rarer ones could not be regarded as mutations. They showed a good deal of cross-immunity. They had definite practical implications; their pathological manifestations were varied, but could be divided into three groups: continued fever of the enteric type, acute gastro-intestinal irritation, and general septicæmic infections. There was much evidence to suggest that certain types had their specific hosts and particular pathological activity. Paratyphoid B seemed to have been obtained from swine in one or two cases, but these exceptional deviations did not invalidate the normal picture of their habits. There were three groups: a fully specialised type with a definite host and action, such as *S. abortus ovis* and *B. paratyphosis*; a generalised type which attacked various creatures and produced a wide range of symptoms; and an intermediate variety with specialised host but not yet specialised type of action. *B. aertrycke* seemed to be near to the common ancestor. It could not adapt itself to a human host; it was either swept out or it killed the host. The types on the way to specialisation seemed to tend to cause septicæmic disorders; *B. suipestifer II* was an example. The paratyphiod strain for man was purely an invasive type; *B. aertrycke* killed if it invaded at all. Possibly the latter had some special property, but research seemed to suggest that the difference lay rather in variation of host response. *B. paratyphosus* B was non-pathogenic to the guineapig and *B. aertrycke* was a purely invasive organism. Much time was wasted in paratyphoid epidemics in looking for chronic human carriers, which the organism did not use. The possibility of a recent temporary carrier could easily be investigated. Outbreaks of *B. enteritidis* (Dublin) had been studied in calves, and this work illustrated how much accurate studies of the distribution and pathological activities of the different types would help in preventing outbreaks. Human outbreaks due to this organism had been recorded in about eight areas. The Newcastle-on-Tyne (1913) and the Aberdeen (1925) outbreaks had probably been due to the Dublin organism. In both cases the vehicle had been milk. This type had fairly restricted hosts in animals but still caused all varieties of pathological disorder in man. It had gone so far on the road to specialisation in the calf that its pathogenicity for other hosts was low; it did not kill man. Much more work on types and activities remained to be done.

Mr. R. LOVELL, Ph.D., said that almost all domestic animals could suffer from salmonella infection; sometimes the cases were sporadic and sometimes an animal acted as host reservoir. Some diseases were solely of economic importance and others were a danger to man. Abortion in mares and sheep—and occasionally goats—and bacillary white diarrhœa in chickens were well-defined and limited conditions. Other organisms were much more cosmopolitan and had been found in a great variety of hosts, e.g., *B. enteritidis*. Some originally found in man had since been found to be a cause of disease in birds or animals also. Recently dogs and cats had been brought into the picture. *B. abortus canis* caused abortion in the bitch and a paratyphoid-like disease in man. Till quite recently paratyphoid B had been regarded as solely a human pathogen, but in an outbreak in Norway a dog seemed to be the source of infection—the evidence being the presence of agglutinins in the serum of that dog, though not in 23 other dogs. Attempts had been made to subdivide the more cosmopolitan types by biochemical and serological means. The group had a complicated antigenic structure and difficulties were many. Many healthy animals contained natural agglutinins against both "H" and "O" antigens, and the serum of man might be complicated by antityphoid inoculations.

In inoculated persons serological tests often gave ambiguous results. Repeated quantitative tests with both "H" and "O" suspensions should be made, and a level first established before beginning to look for a rise. Permanent carriers of the typhoid bacillus might be distinguished from convalescents. In animals the problem was much more complex. Sera often had to be examined for latent infection and the normal agglutinin level must always be determined, and age and sex must be taken into consideration. To detect carrier animals it was necessary to examine the sera of all the animals in the herd. Carriers of the Dublin type could be picked out in this way. Reciprocals of the dilutions would be found to vary widely in normal healthy animals, but a useful average could be determined.

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If sera were taken from natural cases of disease the results were not clear-cut, probably because of minor antigenic components.

Salmonella organisms were often found in association with viruses—e.g., the virus of swine fever. The presence of the virus seemed to enable the salmonella to proliferate. Dogs and ferrets with distemper would sometimes yield salmonellas, and laboratory stocks would from time to time develop salmonella infections. These organisms should, nevertheless, not be considered as saprophytes in the intestines of normal animals.

SALMONELLA IN HEALTHY PIGS

Dr. W. M. SCOTT said that the puzzle of the origin of human infections had led him to examine healthy pigs at slaughter. Some German investigations had given an average of 7 per cent. positive; an inquiry in England had been negative, and another in the Argentine highly positive. In one year 300 people had been involved (seven fatally) in outbreaks of disease ascribed to pig flesh. A large bacon factory had agreed to supply mesenteric glands and spleens from the healthy pigs passed for slaughter. Salmonellas had been found in twenty batches (ten pigs to a batch) —in two cases in the spleen only; and in seventeen cases the glands only. Assuming that each batch owed its infection to one pig only, there were 23 infected pigs among 500—at least 4·6 per cent. The actual percentage was probably much higher. In another factory, on the other side of the country, the percentage of infection proved to be 3·6, and this was probably an under-estimate owing to deterioration of a reagent. Suspension in brilliant green peptone water seemed to be the most successful technique in the first research and the direct McConkey plate in the second. Several parallel methods ought therefore to be employed. Several varieties of organism had been found, including choleræ suis, aertrycke, Thompson, and Newport.

All these pigs had been passed fit for human food and had been so used without known mishap. Perhaps the rarity of spleen infection argued rarity of flesh infection: offal preparations seemed to be the most dangerous, but even in them there would need to be considerable proliferation to constitute a pathogenic dose. Nevertheless, this source of specific pathogens seemed to call for investigation. Pigs were fasted before slaughter, crowded in pens; perhaps in this stage they ingested material from an occasional infected pig. The mesenteric infection suggested recent contamination. In more favourable times the work might be continued along these lines.

SALMONELLA IN DOMESTIC BIRDS

Mr. R. F. GORDON, M.R.C.V.S., said that epizoötics caused by salmonella had been recorded in chicks, ducklings, hens and other domesticated birds. One source of infection was the infected ovary. Nearly 1 per cent. of eggs had been found contaminated with salmonella organism, and outbreaks of disease in man had been traced to the consumption of eggs. Thousands of ducklings had been lost daily as a result of epidemics of Gaertner and other salmonellas. Control measures had been directed to limiting spread and detecting carriers. Improvements in sanitation and management had caused a drop of mortality-rate from 30 per cent. to 3 per cent. All the birds had then been tested and 4·6 per cent. had given a positive reaction. The percentage had increased with the age of the birds, being 17·3 per cent. in fourth-year birds and just over 1 per cent. in first-year birds. Probably rats and mice served as a reservoir. Of 79 carrier ducks that had been examined bacteriologically, 74 had given positive reactions to *B. enteritidis* Gaertner, which had been isolated from the ovary, from old encapsulated egg material, from gall-bladder, liver, spleen, heart wall, oviduct wall and bowel. At the most recent test 29 ducks had given negative serum reactions, but salmonella had been obtained after death from the tissues of birds giving negative serum tests. A titre of 1/20 should be regarded as criterion of infection. Eggs from carrier birds tended not to hatch, but the ducklings that emerged seemed to escape infection. Egg transmission did not seem to be the most important method of transmission. Carrier birds laid few eggs, with a low percentage of infected eggs or none at all.

Dr. J. M. ALSTON described sporadic cases in London municipal hospitals. The disease was usually mild; perhaps in epidemics such mild cases were not noticed. It was difficult to determine to which of the classical types a given individual strain belonged. He asked if any work had aimed at showing such a transmutability of the salmonellas as had been demonstrated among the pneumococci.

Dr. A. W. DOWNIE said that the recovery of material from ducks giving a negative serum test raised the question of the value of serological surveys. He asked if the same test had been applied during the outbreak. (Mr. GORDON replied that it had not.)

Dr. H. SCHULTZ said that over 80 types had been listed and the antigen symbols had gone through the alphabet to Z15. He instanced some of the characteristics of the group and of certain irregularities found in undoubted members of the group.

Dr. J. C. CRUICKSHANK pointed out that varying effects produced by organisms of this group, and the possibility of correlation between them and toxin production. He asked if any diagnoses could be made by serological examination.

Mr. P. BRUCE WHITE thought there were certain differences in the toxicity but had never been sure whether it was due to production of a special toxin or to differing reactions of the animal. He was interested in the sporadic *Dublin* and *suipestifer* types of continued fever, in which the organism had never been isolated from the intestine. Salmonella was often associated with protozoal infections, such as malaria and relapsing fever. *B. suipestifer* must be very often swallowed without any resultant infection; the factor of resistance must play a part and possibly there were three types: non-infective to man, producing febrile disease, and producing thorough gastro-enteritis. He had often tried to produce transmutation, but without any success. Rough and smooth in salmonella might not correspond with the same characteristics in pneumococci.

Dr. R. T. ST. JOHN-BROOKS said that 37 salmonella centres had been established in various countries throughout the world. The machinery was all there.

M. & B. 693 IN PRESCRIPTIONS ONLY.—Subject to the Rules Publications Act, M. & B. 693 will be included in Part 1 of the Poisons List and also be subject to the fourth schedule to the Poisons Rules as from April 1 next. This is the implication of the draft rules and the draft order issued by the Home Secretary as noted in *The Lancet* of Feb. 17 (p. 325). Sulphapyridine which is also known under the trade name of Dagenan is closely allied to the sulphonamides which were added to the Poisons List and the fourth schedule to the Poisons Rules in 1938 (*Lancet*, 1938, **2**, 647). While sulphapyridine has in theory been available to the public in the same way as any other uncontrolled commodity, it has in fact been the practice of pharmacists to refuse to supply it except on doctors' prescriptions.

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE

At a meeting of this society on Feb. 15, with Sir Rickard Christophers, F.R.S., the president, in the chair, a paper on the

Chemotherapy of Protozoal Infections

was read by Prof. Warrington Yorke, F.R.S. He recounted how the observation that trypanosomes metabolise immense quantities of glucose led to the study of carbohydrate metabolism in animals infected with the parasites, and that hypoglycæmia was often found. It was also suggested that Germanin acted by interfering with the carbohydrate metabolism of trypanosomes, and various workers therefore examined the action of hypoglycæmia-producing substances in experimental infections. Among such substances, Synthalin, a guanidine derivative, was found to exert a particularly powerful therapeutic action. It seemed improbable, however, that any degree of hypoglycæmia compatible with the life of the host would suffice to affect its trypanosomal infection, and, in fact, on testing synthalin in vitro it was found to be itself directly and powerfully trypanocidal, a concentration of only 1 in 200 millions destroying a suspension of *Trypanosoma rhodesiense* within 24 hours at 37° C. Synthalin, consisting of two guanidine groups connected by a long alkylene chain, differed in constitution from all other known trypanocidal substances and the discovery of its action opened up a wide field of biological and chemical inquiry. A large series of guanidines, isothioureas, amidines and amines, with alkyl and alkylene chains, was studied and it was found that the most active, undecane-1 : 11-diamidine, produced permanent cures in approximately 100 per cent. of mice and rabbits infected with the laboratory strain of *T. rhodesiense*. A further series was then prepared in which the central inert carbon chain of the previous compounds was replaced by aromatic linkages, and certain of these aromatic diamidines—namely, 4 : 4′ diamidino stilbene, 4 : 4′ diamidino diphenoxy propane and 4 : 4′ diamidino diphenoxy pentane—were exceedingly active both in vitro and in experimental infections in animals. With diamidino stilbene, for example, cures were obtained in mice with doses as minute as 0·01 mg. per 20 g. mouse and the chemotherapeutic index was about 30. Equally satisfactory results were obtained in rabbits where such a small dose as 0·5 mg. per kg. body-weight—one-fortieth of the maximum tolerated dose—repeated on each of five consecutive days cured all of a series of infected animals. In view of the remarkable activity of these compounds against *T. rhodesiense* their effect on other protozoa was examined and they were found to exert a powerfully curative action on *Babesia canis* infections and on *Leishmania donovani* infections. They exerted a less powerful effect on *T. congolense* infections and on certain malaria infections of man and monkeys, but they had no effect on *T. cruzi* infections or those due to *Spirochæta recurrentis* or *Spirillum minus*. Clinical trials were then undertaken and the preliminary reports from Africa show that the drugs produced a remarkable and rapid clinical improvement in human trypanosomiasis, although in some cases the cerebrospinal fluid was unchanged at the end of treatment. The diamidino diphenoxy propane and pentane compounds are perhaps giving better results than the slightly more powerfully trypanocidal stilbene compound; this may be due to the fact that the former are more soluble and possibly more diffusible than the latter. The stilbene compound is also being examined in the treatment of human leishmaniasis and the results are distinctly promising, even in infections with *L. infantum*, which are notoriously unsatisfactory to treat. Up to now these aromatic diamidines have been given to about 400 patients in doses of from 0·5 to 2·0 mg. per kg. body-weight, intravenously or intramuscularly, daily or on alternate days, usually for ten or twelve injections, although longer courses have been administered. So far no serious accident has been reported but many of the patients who received the larger doses exhibited transient symptoms, such as flushing, headaches, tachycardia, sweating or nausea, which, however, passed off within half an hour. Albuminuria or other signs of renal irritation have not been observed. Although the results so far obtained are promising, Professor Yorke pointed out that the work is relatively in the early stage and that optimism must be tempered with caution.

Mr. A. J. Ewins, Ph.D., and Mr. H. King, F.R.S., then described some of the chemical aspects of the work and Sir Henry Dale, F.R.S., explained how the research had developed originally from a study of the metabolism of the parasites. Dr. F. Hawking showed a photomicrograph demonstrating that trypanosomes exposed to the stilbene compound become fluorescent in ultraviolet light. Dr. F. Murgatroyd pointed out that the lack of improvement in the cell and protein content of the cerebrospinal fluid following treatment was not necessarily of adverse significance, provided that the trypanosomes had disappeared; with standard treatments the cells and protein sometimes at first increased and later returned to normal spontaneously. He inquired what was the condition in the 8 cases with pathological fluids who had been observed for 3 months after treatment.—Dr. Hugh Stannus asked about the action of the drugs on arsenic-resistant strains and Dr. C. C. Chesterton also spoke.

In reply Professor Yorke said the drugs were effective against arsenic-fast trypanosomes. He agreed with Dr. Murgatroyd, but so far only the results of examining the spinal fluid immediately after treatment were available as the 8 cases referred to had not yet been repunctured.

The Lancet 100 Years Ago

Feb. 29, 1840, *p.* 853.

From an abstract of an article by Mr. W. Brown of Edinburgh.

Although the cultivators of medicine are so numerous, it is still a question whether the art be now in a progressive state. The more general opinion is, that medicine is advancing with a steady progress to perfection, but a few men, not undistinguished in science, maintain that there is no real progress, but only progression in a circle, that is, a constant return to the former position. . . . If there be any diminution in the rate of mortality, it is attributable not to the increased power of medicine, but to those happy arrangements of modern society which have prevented the frequent occurrence of famine and pestilence, and have provided more perfect clothing and greater cleanliness. Chemistry has, indeed, analysed and combined various medicinal agents, and every now and then some bright idea has been elicited from the laboratory, but the *currus triumphalis* has been brief. . . . But it appears to me that the principal improvement is, that a greater number of practitioners are now masters of the existing knowledge, and are (though not discoverers) intelligent and industrious appliers of the discovered truths. Formerly, knowledge was difficult of access, but it is now open to men even of ordinary minds and common-place habits.

REVIEWS OF BOOKS

Pathological Histology

By ROBERTSON F. OGILVIE, M.D. Edin., F.R.C.P.E., lecturer in pathology, University of Edinburgh. Edinburgh: E. and S. Livingstone. 1940. Pp. 332. 27*s.* 6*d.*

ALTHOUGH there has been a veritable cacoethes for writing textbooks of pathology in recent years, there have been few atlases of pathological histology and Dr. Ogilvie's work can be sure of success. It is intended as a companion to a standard pathological textbook, and deals authoritatively with the morphology of all the conditions described. It is divided into general and special pathology and each process is illustrated by one or more coloured photomicrographs (the Finlay method was employed) which have been prepared by Mr. T. C. Dodds, F.R.P.S., who is clearly a master in the art. The colour reproduction is admirable (though in places the blues are greenish) and the resolution is quite good. There are few slides which a student receives in an ordinary histology course which are not represented here, though one would have foregone bilharziasis of the intestine for illustrations of other intestinal lesions more commonly seen in temperate countries, such as atrophic gastritis with intestinal heterotopia, ulcerative colitis or regional ileitis. A graver criticism is the paucity of low-power views. It is a common fault in students to give scant attention to low-power microscopy in preference for the details seen with high power, whereas much more will be learnt if most time is spent with the naked eye, hand lens and inch objective, and the illustrations of rheumatic valvulitis, syphilitic aortitis and a gastric ulcer are all at too great a magnification.

The book is remarkably cheap and can be recommended to all who have histological dealings.

Elementi per una teoria matematica del contagio

By Dr. MARCELLO PUMA. Rome: Editoriale Aeronautica. 1939. Pp. 200.

A GENERAL characteristic of Italian writers on statistical and allied subjects (the Italian school of statistics is now, and has been for some time, easily the leading continental school) is lucidity coupled with a determination to restrict purely mathematical treatment to the minimum necessary for success. Dr. Puma is true to type. His primary object is to show that in studying the development of an infectious disease in a community, the rate of increase in the number of infected members (x) with time is proportional to the product of the number of those infected at a given instant and of those not yet infected, or, in mathematical shorthand, that the equation $\frac{dx}{dt} = kx\,(n-x)$ is fundamental.

This equation in its simplest form is well known both to biochemists and demographers. To demographers it is known as Verhulst's, or the logistic, equation, and Volterra has recently obtained it as a particular case of a more general proposition. That an equation of this form should more or less satisfactorily describe the successive numbers of people who at various intervals from the moment of introduction of infection will have become infected is not of course surprising. Its integral, which Pearl's work has made familiar, makes x increase along an S-shaped curve to an asymptotal value. Obviously, in a closed community, this must happen; there could not be more than n infected out of n! But it is not obvious that the approach to the limit should follow the particular sinuosity of the S. Dr. Puma explains well why the approach is reasonable. But one is still far from practical considerations. Even if we could neglect (which we cannot) births, deaths and migrations, there would still be the question of possibly changing infectivity and virulence, the development of immunity and other complications. An equation which is simple when the coefficients are constants may be the reverse when the coefficients are themselves variables. Dr. Puma patiently tackles complications one by one. We do not think, and he probably would not claim, that he has devised a working tool with which a field epidemiologist can at once solve the problems of epidemicity and spread of infection. But what he certainly has done is to write an introduction which anybody who has got far enough in mathematics to know the meaning of "differential coefficient" and "integral" can read. That is a considerable achievement.

1939 Year Book of General Surgery

By EVARTS A. GRAHAM, A.B., M.D., professor of surgery, Washington University school of medicine. Chicago: The Year Book Publishers; London: H. K. Lewis and Co. 1939. Pp. 796. 15*s.*

THESE yearbooks, which summarise the surgical literature for the preceding twelve months, are valuable to the surgeon who is interested in his own particular rare case or who wants to follow the current trend of events in his own line. There is much to interest the casual reader as well, but he must use his judgment, for that "doctors differ" is very apparent in such a collection of opinions on procedure and diagnosis. Thus, Cotton writes on the ease with which a Colles's fracture is disimpacted and on its treatment in flexion. He is followed by Salisbury Wood, who stresses the difficulty of disimpaction and advises splinting in plaster in the neutral position. Here and there the editor interpolates his own pungent comments; it might be of service if he summarised briefly the conclusions and conflicting views of several observers in the light of his personal knowledge and experience. The treatment of acute appendicitis has been the subject of several important papers during the year; the "expectant" form of treatment comes in for much practical comment, mostly adverse. It is interesting to find a summary of an article on appendicitis by the son of the Fitz who, in 1886, according to the editor, first put the condition on the map. It is not surprising to find so many articles on every aspect of anæsthesia. Surgery of the chest is fully dealt with in a special chapter. Particular mention is made in the introduction to the report by Gross and Hubbard of the first successful ligation of a patent ductus arteriosus.

Surgical Diagnosis

By STEPHEN POWER, M.S. Lond., F.R.C.S., assistant surgeon, London Homœopathic Hospital. Bristol: John Wright and Sons. 1939. Pp. 228. 12*s.* 6*d.*

THIS small book is distinguished by a freshness of presentation that at once commands attention. Signs and symptoms are discussed, and not just tabulated, so that the student will learn to evaluate the significance of what he observes. Having read the excellent chapter on enlargement of the prostate, he should be able to appreciate the changes in urinary function that underlie the modern interpretation of the symptoms and control the treatment. The sentence or two at the beginning of the chapters each has its individual touch, whether it is the surprise of the practitioner on learning of the frequency of gall-

stones in the post-mortem room; the lack of alarm of the patient who suffers from hæmaturia; or the young clinician's reliance, in his investigation of swellings of the neck, on his knowledge of anatomy and "some recollection of embryology."

This is in no sense a complete reference book of surgical diseases, but it covers the field of the diseases commonly met with in hospital and private practice. The illustrations, though few, are direct and illuminative. The student will find the book a wise introduction to clinical surgery.

Nelson New Loose-leaf Medicine

Renewal pages. London: Thomas Nelson and Sons. 1939.

THE latest renewal pages contain articles to replace those that have become out of date; a newly written survey of the administrative aspects of medical services in the United States entitled "The Organised Care of the Sick"; and surveys of recent advances in the treatment of schizophrenia and of arthritis. In the first category are sections on streptococcus sore throat, bacillary dysentery, gonorrhœa, amœbiasis, trichiniasis, infections other than rheumatism causing cardiovascular disease, normal and abnormal blood-pressure, and tumours of the stomach and small intestine. Of these the section on bacillary dysentery, by Prof. Duncan Graham, is especially complete and easily read. The new section on medical services in the United States is particularly interesting at a time when medical organisation in this country is in the melting-pot. It is significant that even in the United States, which is apt to be regarded as the home of individualism and of large-scale philanthropic munificence, "from 1909 to 1937, federal institutions increased from 71 to 329, state institutions from 232 to 522, and all others from 4056 to 5277."

Diseases of the Biliary Tract

Diagnosis and Management. By R. FRANKLIN CARTER, B.S., M.D., F.A.C.S., associate clinical professor of surgery in Columbia University, at the New York Postgraduate Medical School; CARL H. GREENE, Ph.D., M.D., F.A.C.P., associate clinical professor of medicine at the school; and JOHN RUSSELL TWISS, A.B., M.D., F.A.C.P., assistant clinical professor of medicine at the school. London: Baillière, Tindall and Cox. 1939. Pp. 432. 32*s.* 6*d.*

THIS book is based on the experience obtained during the last ten years in the clinic for the study of diseases of the liver and biliary tract at the New York Postgraduate Medical School, and it includes a review of the operative results in 4000 patients. It is essentially clinical in outlook, and in spite of some inevitable redundancy presents a remarkably clear picture of the subject. The opening section on the more theoretical aspects is the least satisfactory, but those on diagnosis, medical and surgical treatment, and the results of surgery will repay careful consideration. The main points that the authors bring out—with typical transatlantic wealth of detail—are the value of duodenal drainage in diagnosis, the importance of assessing in any one case the part played by functional disorders of the biliary tract (biliary dyskinesia), and the necessity for care in selecting cases suitable for surgery.

Fluorescence Analysis in Ultraviolet Light

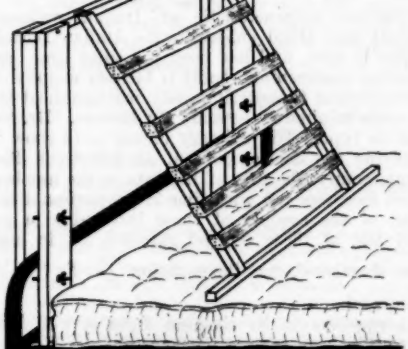
(3rd. ed.). By J. A. RADLEY, M.Sc., A.I.C., and JULIUS GRANT, Ph.D., M.Sc., F.I.C. Edited by E. HOWARD TRIPP, Ph.D. London: Chapman and Hall. 1939. Pp. 424. 22*s.* 6*d.*

THE authors have rendered valuable service to investigators in several fields by judiciously sifting from the plethora of publications a readable yet informative account of this purely technical subject. The combined judgment of two experts is a guarantee that the increase in size of this edition is due only to important inclusions. The sections which most concern the medical worker deal with bacteriology, water and sewage, foods and drugs, forensic medicine, and certain aspects of medical and biological science. Any investigator requiring a new analytical method might consult this textbook on the possibility of using ultraviolet radiations.

New Inventions

A SIMPLE BED-REST

THE wooden bed-rest here described can be adapted to any form of bed and, since it is clamped on the head rails or bar, does not take up part of the length of the bed, and it requires but few pillows to keep the patient propped up. The main frame consists of two paired uprights joined by a cross-bar to which is hinged a light frame crossed with canvas webbing. Each upright is made of two pieces of wood, each measuring $29 \times 1\frac{3}{4} \times \frac{3}{4}$ in. Between their top extremities is screwed the horizontal cross-bar measuring $26\frac{1}{2} \times 1 \times 1$ in. At the lower part of the uprights holes are drilled at equal distances to take wing bolts. Two of these bolts tighten the upright pairs on the head rail at whatever height is convenient. If one arm of an upright is carried upwards for 1½–2 ft. and fitted with hooks, it provides a stand for irrigation or for lighting apparatus. The hinged frame is made up of three pieces of wood measuring $\frac{3}{4} \times 1$ in. on cross-section. The uprights are 27 in. long and are secured 21 in. apart at the top by hinges to the main frame, and at the bottom the cross-bar projects 3 in. on each side. Five strips of canvas webbing $1\frac{3}{4}$ in. wide are secured to the uprights, the lower two or three being closer together



to take the point of greatest strain. The angle at which the rest lies can be adjusted by raising or lowering the main frame on the head rail or by wedging up the mattress to make a firm support for the base of the rest. The cost, excluding labour, is about 2*s.* 6*d.* in white wood.

My thanks are due to Mr. Millington, who is in charge of the occupational training at Claybury Emergency Hospital, for his coöperation in the design and mass production of this bed-rest.

T. HOLMES SELLORS, D.M. Oxfd, F.R.C.S.

THE LANCET

LONDON: SATURDAY, MARCH 2, 1940

CONTROL OF CEREBROSPINAL FEVER

AT this season of the year a rise in the incidence of cerebrospinal fever is to be expected, but during the last few weeks the number of cases notified in England and Wales has been greater than in the previous record peak of 1915, although the rise has not yet attracted much public attention. Epidemiologists who studied the behaviour of outbreaks during the last war are not surprised that the prevalence of the disease has been unusually great and are apprehensive of a considerable epidemic in the near future. The expansion of the regular services, the introduction of conscription and full war mobilisation, combined with the blackout and the bitter weather which practically abolished effective ventilation, should have made an ideal setting for a serious outbreak. Cerebrospinal fever is essentially a disease of recruits—i.e., of new entrants to community life who have not had time to become adapted to, or latently immunised by, the bacteria in their new environment. Any increase in the rate of recruiting naturally strains barrack and camp accommodation; dangerous overcrowding is not unlikely to occur, unless those responsible for providing accommodation have enough vision to insist that dormitory space is increased in the same proportion as the rate of the growth of the populations. Overcrowding is an all-important factor in aiding the dissemination of meningococcal and indeed of all droplet-spread infections. The effect of overcrowding, especially in sleeping quarters, was demonstrated by ALISON GLOVER'S classical work during the last war when it was shown that an adequate increase in the distance between beds was followed by a reduction in the morbidity from cerebrospinal fever to a minimum. Acceleration of the rate of recruiting in itself, apart from any overcrowding, appears to be a fundamental factor in the development of such outbreaks, and an acceleration of recruiting is of course unavoidable in war-time.

To limit the spread of meningococcal infection the following principles should be observed as far as circumstances permit. (1) As much space as possible should be given to recruits in their sleeping quarters, even at the expense of the space allotted to trained and salted men. There should always be at least three feet between the edges of adjacent beds occupied by recruits. (2) Large dormitories containing 50 to 100 beds should be avoided. The more the men are segregated into small separate groups at night the less is the chance of infection travelling from group to group. (3) Recruits should be entered in large batches at long intervals of time in preference to small numbers at short intervals, and every effort made to avoid mixing men of different periods of service. This is a principle whose importance is not often recognised, but the very frequent addition of batches of new entrants to a community undoubtedly increases the total morbidity, and probably augments the average severity of the illnesses in that community. An analogous phenomenon has been noted by TOPLEY, GREENWOOD and their colleagues when batches of susceptible mice are added to mouse populations at varying intervals. (4) Some observers believe that the spread of meningococcal infection is favoured when the inhabitants of a room are allowed to crowd together, especially around fires and stoves. It may be impossible to prevent the natural sociableness of community life but local crowding is reduced by the use of central heating instead of open fires or stoves. (5) Finally, care should be taken that ventilation is efficient and that blackout arrangements allow a free circulation of air. Various types of light-excluding but air-admitting shutters have been devised; they should be fitted to a reasonable proportion of the windows of all dormitories, and to those living rooms which are occupied after sunset.

If these principles are strictly observed the incidence of cerebrospinal fever—and indeed of all infectious diseases—will be reduced. Nevertheless the causes of meningitis epidemics are obscure, and as long as the fundamental factor—acceleration in the rate of recruiting—is uncontrollable, cerebrospinal fever may remain prevalent in spite of all our efforts to prevent it. In the past, stress was laid on the discovery and segregation of carriers of *Neisseria meningitidis* as a preventive measure. It is now realised that the carriers of the meningococcus are too numerous to deal with effectively, and that owing to the relatively short period of infection of most carriers, their intermittancy, and the ready spread of infection from man to man and back again, those that are found free from infection today may be found carrying tomorrow. Carrier hunting as a practical preventive measure has proved to be a waste of time. The use of carrier rates as an index of the likelihood of an epidemic arising or the efficiency of preventive measures has also proved unreliable. DUDLEY and BRENNAN,[1] for example, report a carrier rate of 5 per cent. which was accompanied by cases of cerebrospinal fever; while at the same time but in another place, among men strictly comparable in all other respects, the carrier rate for agglutinable meningococci was 50 per cent. unaccompanied by any symptomatic infections with *Neisseria meningitidis*. Mass gargling, spraying or other local treatment is to be discouraged. There is no evidence that they have any effect on the morbidity of cerebrospinal fever, and experiments on animals suggest that interference with the *normal* secretions of the throat and nose may be actually dangerous. Mass inoculation with meningococcus vaccine is still under investigation; the results so far are not encouraging. Even in major epidemics the incidence of cerebrospinal fever is low compared with

1. Dudley, S. F. and Brennan, J. R. *J. Hyg. Camb.* 1934, **34**, 525.

that of many other infectious diseases which cause a greater total mortality. The anxiety, disorganisation and even panic that is often produced by an epidemic of meningitis is caused by the fulminating character of the disease and its high case-fatality. If this case-fatality can be prevented cerebrospinal fever need not be dreaded any more than (say) measles. Everyone should realise that cerebrospinal fever is the disease which responds more dramatically than any other infection to suphanilamide or sulphapyridine. If every patient was given one of these drugs *in adequate doses at the earliest moment* that meningitis was suspected, the case-fatality would be reduced to less than 5 per cent. This has been proved true by many physicians, among whom may be cited BANKS [2] for this country, and BRYANT and FAIRMAN [3] for equatorial Africa. The latter showed that under appalling environmental and hygienic conditions, which could not be corrected, sulphanilamide and sulphapyridine reduced the fatality among the treated natives from about 70 to 5 per cent. Prevention is better than cure. True, but if you cannot prevent cerebrospinal fever you may as well cure it.

THE HORROR OF LOUSINESS

IN a classic of 1917–18 Sir ARTHUR SHIPLEY described the louse as a minor horror of war. But the louse may be the greatest of war's horrors. By the disgust that it produces, by the sleeplessness that results from it, by the ubiquity of the skin lesions, and by the mortal disease that it carries in its bite it surpasses any. Because it is unremitting the soldier dreads it more than artillery fire. When all is quiet on the western front the enemy may start a small bombardment; the sentry sees the flash but knows the chance of being hit is small. Even when the great barrage of an impending attack crashes down the soldier knows that it is only for a time. But from the slow crawl of the louse over his body there is no respite. Tomorrow and tomorrow and tomorrow it will go on; after he has had his hot bath and changed his shirt it will soon start again. No-one can be blamed for becoming lousy, or punished for failing to get clear; yet the control of lousiness is not medical but administrative and disciplinary. Control, not cure; for in war there is no cure. Should control be relaxed, a single louse on a nether garment may within six weeks become a complete infestation of a company. Corps or divisions may build baths or brigades develop washing places, but officers must arrange men's duties so that they can use them. The medical officer is the expert adviser on all points connected with the evil thing; he cannot deal with it himself. That must be done by the platoon commander under instructions from his senior. The unit that tries to make the medical officer responsible will become the lousiest in the formation. It has been said, no-one quite knows by whom, that cleanliness is next to godliness. This may not be true for those who live in luxury, with hot water, sweet-smelling soap, and heated towels. They have but to control their inner selves, to grapple with stomach and with sex, with anger and uncharitableness. It needs no virtue for such to keep themselves clean. But to the poor cleanliness is a part, and a great part, of godliness; and in wartime all on active service and in camps live as do the poor. To rise above discomfort and to struggle, not against oneself and one's inner impulses, but with oneself against those outer stimuli of cold and wet and dirt and all the foulness of insanitary surroundings, and still to keep oneself clean, means greater godliness than many know exists. It needs much virtue to wash in a bucket of ice-cold water, in the open, with the rain pelting down upon one's bare back. And it is washing that alone keeps down the louse which likes a dirty body upon which to live. The soldier may call himself "chatty" and laugh at it; but no civilian or back-area military man has any right to laugh with him, any more than he has when he laughs at the shell he calls his "packet." Besides the body there is the mind. There are some to whom the idea of harbouring a louse is so repellent as to unhinge the mind and they become inefficient with disgust. In a unit the scourge starts in those of less mental capacity than their fellows; and it is in these that it will last remain to spread again to all when control is removed. And that control is perhaps the worst of all; for it depends on inspections which, if properly done, are so undignified that no man would willingly submit to them, nor would any in his normal mind conduct them excepting as a duty.

2. Banks, H. S. *Lancet*, 1939, **2**, 921.
3. Bryant, J. and Fairman, H. D. *Ibid*, 1939, **1**, 923.

PNEUMONIA IN THE NEWBORN

TWENTY years ago the loss of life during the first month of independent existence was generally regarded as the natural death-rate of infants. It was then that J. W. BALLANTYNE began in Edinburgh to analyse the causes of what he was the first to call neonatal death, in the light of the routine performance of necropsy. The laissez-faire attitude has given place to a spirit of hopeful inquiry, of which one example has been the claim of P. J. FLAGG [1] to be able by insufflation after intubation to rescue many cases of so-called asphyxia neonatorum. Respiratory conditions, whether certified as asphyxia, atelectasis or pneumonia, have always stood high in the list of causes, but the data on which certification of these deaths is based are still too vague for the figures to be of much value. MACGREGOR,[2] however, has found inflammatory changes in the lungs of one in ten of stillborn infants and one in three of infants who died within a month, so that measures of prevention in this direction, which seems the most promising one, are well worth while. Two different processes have to be considered according to the age of the child. In stillborn infants and those who die within the first few days the aspiration of liquor amnii seems

1. Flagg, P. J. *Surg. Gynec. Obstet.* 1938, **67**, 153; see *Lancet*, 1938, **2**, 731.
2. Macgregor, A. R. *Arch. Dis. Childh.* 1939, **14**, 323.

to play a major part. SNYDER and ROSENFELD [3] have shown that during intrauterine life respiratory movements are normal and liquor amnii circulates in the bronchi. After birth the vigorous child has no difficulty in clearing its air-passages, but in a feeble one it may be impossible for either the child or the obstetrician to remove liquor amnii and mucus completely, so that the lungs are not fully expanded. MACGREGOR has demonstrated in sections of lung the formation of a "vernix membrane," the vernix becoming plastered to the walls of the alveoli and bronchioles and seriously obstructing the passage of air. Pneumonia rapidly develops in these cases, and the frequently negative results of bacteriological examination suggest that it arises from chemical irritants such as meconium in the liquor amnii rather than from infection. In practice the incidence of asphyxia in newborn babies, with the resultant atelectasis and pneumonia, mainly depends on the care taken to remove liquor amnii and mucus from the respiratory tract after birth and on the vitality of the child. If the technique is efficient and the air-passages are thoroughly cleared deaths from this cause will be few except in feeble and more particularly premature infants. If the deaths associated with prematurity are to be reduced there must be improvement in the management of labour, a wider application of the newer methods of resuscitation, and further research into the causes of premature birth. Too early and too late application of forceps are commonly responsible for asphyxia as well as for intracranial hæmorrhage, and the injudicious use of anæsthetics and analgesics are obvious dangers. The methods of resuscitation advocated by FLAGG and by BLAIKLEY and GIBBERD [4] should be more widely practised in maternity hospitals, and the practitioner should hang the half-drowned baby up by the heels and use a mucus catheter. Lessening the number of premature births is more difficult, since many are due to pre-eclamptic toxæmia and in the present state of our knowledge are unavoidable.

After the first week of life the respiratory causes of death are in a different category. They then more closely resemble those of the adult, being due to infection acquired from the child's environment, and should largely be preventable. Coliform bacilli and staphylococci are often the infecting organisms, in contrast to what is seen in later life, and these organisms may be spread by air-borne droplet infection. During the first month of life the mucous membrane of the alimentary and respiratory tracts is said to acquire a local immunity against organisms of the coliform group through repeated contact with them, but before this is fully established they may set up a pneumonia. These organisms are common inhabitants of the mouth and pharynx of adults. MACGREGOR therefore recommends that newborn babies should be handled as little as possible and should spend little time in the ward with their mothers. She has investigated the neonatal deaths in two maternity hospitals A and B. A is old and overcrowded, the babies being kept in the lying-in ward. B is a modern hospital, well situated and spacious; there the babies have their own nursery and go to the mothers' ward only for feeds. In hospital A pneumonia accounted for 21 per cent. of the neonatal deaths after the third day, whereas in B it accounted for only 5 per cent. The figures for B are probably no better than those for any well-run hospital where the mature babies spend a good deal of their days in the lying-in ward, often in a cot slung on the end of the mothers' beds. Unless nurseries are exceptionally roomy it is safer to keep the babies apart from one another. There is much justification for complete isolation of premature babies in cubicles, and for mature babies the important thing is to avoid overcrowding and to see that nurses either stay off duty altogether or wear efficient masks if they show any evidence of an upper respiratory tract infection. The great danger in maternity hospitals is the spread of infection. Among mothers the risk of outbreaks of puerperal sepsis has been almost eliminated, but among babies precautions have not been so effective. Most hospitals still need larger nurseries, with special accommodation for premature babies, including separate cubicles. When such accommodation is provided it will be safe to send very small babies to hospital, accompanied if need be by their mothers. The maternity hospitals will then be making their full contribution to the reduction of infant mortality.

3. Snyder, F. F., Rosenfeld, M. *J. Amer. med. Ass.* 1937, **108**, 1946.
4. Blaikley, J. B. and Gibberd, G. F. *Lancet*, 1935, **1**, 736.

OXYGEN ADMINISTRATION

A MEMO [1] issued this week by the Ministry of Health discusses the reasons for giving oxygen and compares the efficiency of various types of apparatus, especially the B.L.B. mask described elsewhere in this issue. The most important indication is cyanosis of recent origin, and here its efficacy varies with the condition present. It is most likely to be effective in conditions where moist sounds in the chest are widespread and plentiful—e.g., in bronchopneumonia. It is less likely to succeed, but should be tried, where considerable portions of the lung are airless and moist sounds are few—e.g., lobar pneumonia—and it is not likely to relieve cyanosis of long standing, as in chronic heart failure. In addition, oxygen may be valuable in wounds of the chest with respiratory distress, even without recognisable cyanosis; and there is evidence to justify the trial of high concentrations (80–90 per cent. in the alveolar air) in the treatment of wound and surgical shock, surgical emphysema, and air embolism. The methods recommended are the nasal catheter, nasal tubes and the B.L.B. apparatus. The familiar glass funnel is condemned as ineffective and wasteful. With a nasal catheter a flow of 4 litres a minute will double the normal concentration of oxygen in the alveolar air. A similar result with greater comfort can be obtained with nasal tubes supported either by the Tudor Edwards spectacle-frame carrier (see *Lancet*, 1938, **2**, 680) or forked-tube spectacles. With the B.L.B. apparatus the oxygen concentration in the alveolar air can be raised to about six times the normal value (87 per cent.) with a flow of 6 litres a minute. The apparatus is comfortable, tolerated readily for long periods, and economical.

1. Emergency Medical Services. Memo No. 5. Oxygen Administration—Indications, Methods and Types of Apparatus. H.M. Stationery Office. 1940. Pp. 7. 2*d*.

ANNOTATIONS

SUGGESTIONS ON HEALTH EDUCATION

THE third edition of a small handbook[1] issued by the Board of Education for the consideration of teachers and others concerned in the health and education of school-children may be warmly commended to the consideration also of medical practitioners. The text generally has been revised while the chapter on the hygiene of food and drink has been largely rewritten in the light of the importance now attached to nutrition and the facilities afforded by the school for the provision of milk and meals. The opening chapter deals with the significance and place of education in health within the school curriculum, the planning of a health education programme and the methods which may usefully be employed. A chapter sets out in detail what is involved in the practice of health habits particularly in the infant and junior school. A chapter on biology and health shows how essential is a study of life in its various forms as a basis for any intelligent appreciation of health problems by the older boy and girl. Sections deal with nature and nurture, plants and animals in relation to health, useful and harmful bacteria. Unfortunately the place of biology in the course of elementary science in the senior school is at present, for various reasons, inadequately recognised and health education accordingly suffers in presentation and application. Under the heading of Progress towards Health the growth of preventive medicine is treated in a living manner likely to interest older boys and girls and accounts are given of the lives and work of some of the great health pioneers. Housing and town planning, the supply of pure water, the disposal of refuse, the methods adopted for the guarding of health in factory, workshop and mine are related to the experience of the boy and girl and presented in a way calculated to appeal. A chapter is devoted to the prevention of infectious disease, but it is significant that no paragraph deals with the facts bearing upon, or the practice followed, in the prevention of diphtheria by immunisation. Nor is a chapter dealing with education in matters of sex in relation to health included among these suggestions for teachers.

Here, then, is presented the opportunity, throughout the life of the child at school, "to awaken," in the words of Sir Arthur MacNalty in his introduction to the book, "the imagination of boys and girls and lead them to adopt healthy ways of living which will persist all through their lives." How far in practice is this great aim of education realised? Imperfectly it must be admitted, and the fault by no means lies entirely with the school. Education in health cannot attain its end if it ceases to operate in the very middle of the adolescent period. Health education as envisaged in this book can only be realised as it operates throughout the whole developmental period up to the age of 18. For the large majority of the nation's children no consistent guidance in the art of living is forthcoming after the age of 14. In the secondary school the pupils are usually too fully occupied with other things of moment to be concerned with matters affecting the health of the individual or of the community. The time is coming when the Board of Education and the local authority will undertake responsibility for the provision of education, whether for part or whole time and in association with industry, of all children during the whole adolescent period. Until then these admirable suggestions on health education will bear fruit imperfect both in quality and quantity.

1. Health Education. H.M. Stationery Office. 6d.

LIPOCAIC

THE depancreatised dog develops two types of fatty infiltration of the liver. One comes on immediately after the operation and clears up with insulin and suitable diet, whereas the other appears from two to eight months after the operation, in spite of adequate diet and insulin therapy. In 1924 Macleod[1] reported that the second type could be prevented by giving the dog raw pancreas. Later Hershey[2] stated that the condition could be relieved by feeding 10 grammes of lecithin daily, and Best[3] found that the active constituent of lecithin was choline or a closely related body. Dragstedt[4] and his associates in Chicago have observed that dogs suffering from the delayed form of hepatomegaly show loss of appetite and activity, a fall in their insulin requirement, a tendency to hypoglycæmic convulsions and evidence of impaired hepatic function with the bromsulphalein test; they have also confirmed the presence of fatty infiltration of the liver by biopsy. The condition affected nine out of ten of their depancreatised dogs. It was unrelieved by giving 1000 c.cm. of fresh pancreatic juice or 1000 units of insulin by mouth daily. Some of the dogs were benefited by choline in amounts exceeding 2 g. a day, but feeding the dogs on tissues known to be rich in choline, such as liver and brain, had no effect. A cure was, however, always obtained by adding 100 g. of raw pancreas to their daily diet. Dragstedt analysed various fractions obtained from raw pancreas and found that the active substance was contained in the fat-free alcohol extract. This extract worked equally well whether given by mouth or subcutaneously. The ether-soluble fractions containing almost all the lecithin and most of the choline were inert. The fat-free alcohol extract contained less than 2 per cent. of free choline and therefore the amount of choline in the effective dose could not be enough to relieve the fatty infiltration. On this evidence Dragstedt and his colleagues conclude that there is present in the pancreas a substance which they have named lipocaic (*λίπος* fat and *καίω* to burn). They presume that it is another internal secretion of the pancreas and that it may arise from islet tissue other than the Beta cells, since they have been able to extract an active preparation from pancreatic glands in which almost the whole of the acinar tissue had degenerated.

Enlargement of the liver has long been observed in clinical diabetes and has been attributed to inadequate control of the disease. The existence of a condition analogous to that described by Dragstedt in the dog is not as yet recognised in human diabetics, and in a series of cases of enlargement of the liver in diabetic children White and Marble[5] found that raw pancreas had little influence on the enlargement. There have, however, been two reports, by Grayzel and Radwin,[6] and Rosenberg,[7] of cases of diabetes associated with an hepatic enlargement which did not respond to insulin and diet therapy, but receded after the administration of lipocaic. Of great interest from the clinical standpoint is the observation by Dragstedt[8]

1. Allan, F. N., Bowie, J. J., Macleod, J. J. R. and Robinson, W. L. *Brit. J. exp. Path.* 1924, **5**, 75.
2. Hershey, J. M. *Amer. J. Physiol.* 1931, **98**, 74.
3. Best, C. H., Ferguson, G. C. and Hershey, J. M. *J. Physiol.* 1933, **79**, 94.
4. Dragstedt, L. R. *J. Amer. med. Ass.* Jan. 6, 1940, p. 29.
5. Marble, A., White, P., Bogan, I. K. and Smith, R. M. *Arch. intern. Med.* 1938, **62**, 740.
6. Grayzel, H. G. and Radwin, L. S. *Amer. J. Dis. Child.* 1938, **56**, 22.
7. Rosenberg, D. H. *Amer. J. digest. Dis.* 1938, **5**, 607.
8. Dragstedt, L. R., Goodpasture, W. C., Venueulen, C. W. and Clark, D. E. *Proc. Amer. physiol. Soc.* April 26, 1939, p. 63.

that six of his depancreatised dogs developed degenerative changes in the arteries 6–9 months after the onset of fatty infiltration of the liver. The prevalence of arterial changes in diabetes is well recognised and Joslin [9] considers that the diabetic's chief danger is no longer coma but coronary disease and arterial degeneration. The Joslin school have also held that the arterial changes in diabetes are influenced by the fat content of the diet, and Dragstedt found that depancreatised dogs are most liable to develop fatty infiltration of the liver on a diet high in fat and low in protein.

The existence of a second internal secretion of the pancreas appears to be established. Elucidation of the part that it plays in human diabetes, in fat metabolism and in the development of arterial changes, and its relation to choline metabolism, must await the results of clinical trial when purer preparations of lipocaic become available.

MATHEMATICS AND MEDICINE

IN the half century which followed the chartering of the Royal Society the wonderful development of mathematical science due to the genius of Newton, Leibniz, de Moivre and other giants of those days fired the enthusiasm of all scientifically minded men, not least those of our profession. A hope was entertained of making if not clinical medicine at least the young science of physiology "exact" and the school of iatro-mathematicians, of whom the greatest was the Neapolitan, Alfonso Borelli, came into existence. A part of what was dreamed came true; upon some of the foundations then laid, the stately edifice of modern actuarial and vital statistical science was built. But the direct application of mathematical methods to purely physiological or medical problems did not then lead to any very important discoveries. There were two reasons for this. The facts were imperfectly known and the technique of mathematical analysis was not yet sufficiently developed and generally understood to be applicable. So the iatro-mathematical school passed away. Its renaissance in the nineteenth century at first wholly concerned what may be called the statistical aspects of medical problems, primarily descriptive statistics. Farr occasionally touched more general problems—e.g., the possibility of finding general mathematical "laws" of epidemics—in the main, however, his work was descriptive. But during the last thirty years the attention of some original-minded men has been directed again to more subtle and difficult problems of the rôle of mathematical method in the elucidation of medical problems. In this country Brownlee, Ronald Ross, McKendrick and Kermack steadily pursued this difficult task, and in various papers have made substantial contributions to knowledge which in time to come will receive the recognition they deserve. Two obstacles have stood in the way of their general recognition. The first—which applies conspicuously to the work of Ross—is that the writers realised fully, perhaps too fully, the material complexity of the facts to which they wished to apply mathematical methods, so that their enunciations were complex. The second, partly dependent on the first, is that the mathematical analysis was difficult and could rarely be made intelligible arithmetically by concrete examples, owing to the incompleteness of statistical data. There has long been a place for a really elementary introduction to this fascinating but difficult branch of research, and in many respects a little book entitled "Elementi per una teoria matematica del contagio," recently published by Dr. Marcello Puma and reviewed on another page, fills this place.

9. Joslin, E. P., The Treatment of Diabetes Mellitus, Philadelphia, 1939.

PERFORATION OF THE INTERVENTRICULAR SEPTUM

RUPTURE of the heart not infrequently follows infarction, but its clinical interest is confined to the light it has shed upon the effects of sudden distension of the pericardial sac. Less commonly an infarct involving the interventricular septum perforates to produce an interesting syndrome which has been fully described by Bickel and Mozer [1] in an account of 4 personal cases and 32 others drawn from the literature. Its two phases consist of a typical coronary occlusion, followed within a few days by the sudden appearance of a systolic murmur and thrill in the fourth or fifth left intercostal space. Usually the left anterior descending branch is occluded and the perforation is found in the antero-inferior part of the septum. Exceptionally perforation follows obliteration of the right posterior descending branch and is found higher up in the posterior part of the septum. The murmur and thrill are, therefore, more definite in the antero-inferior perforation, and in both types they are detected lower down than in the "maladie de Roger" where the membranous septum is involved. Perforation only happens when thrombosis of one of the descending branches has been preceded by much sclerosis of the other. The syndrome also includes tachycardia and pulmonary stasis. The latter was demonstrated radiologically in one of Bickel and Mozer's cases within thirty-six hours of the perforation. The prognosis is bad, the patient dying as a rule within a few days or weeks from right heart failure.

CHAGAS'S DISEASE

IN the report of the Liverpool School of Tropical Medicine for 1938–39 it is interesting to note that experiments are being conducted on the Machado reaction in South American trypanosomiasis, for the application of the reaction may throw light on the chronic effects of this infection. Carlos Chagas,[2] who first described the disease, laid stress on the involvement of the thyroid gland but this has since been the subject of much criticism, and there is no evidence from experimental infections of animals that the trypanosomes especially involve the thyroid gland. Chagas also described a cardiac form of infection and this may be of real importance. Chronic heart disease is unusually common in South America, and although syphilis is often assumed to be responsible there is often no evidence of this infection. In some cases, however, leishmanial forms of the trypanosome have been demonstrated in the myocardium, and the predilection of the parasite for the heart muscle is a characteristic feature of experimental infections. It would be important if a clear relationship could be shown between chronic myocarditis and infection with *Schizotrypanum cruzi*, and since the trypanosome may be difficult to find some touchstone for infection would be invaluable. Guerreiro and Machado [3] in 1913 devised a reaction, using extracts of the heart or spleen of infected puppies as antigen, for the serological diagnosis of the disease in cases where trypanosomes cannot be found in the blood, and many subsequent workers have attested to its value. The antigens vary widely, however, in activity, and Kelser [4] recently

1. Bickel, G. and Mozer, *J. Helv. med. Acta*, 1939, **6**, 427.
2. *Mem. Inst. Oswaldo Cruz, Rio de Janeiro*, 1909, **1**, 159.
3. *Brazil Med.* 1913, **27**, 225.
4. *Amer. J. trop. Med.* 1936, **16**, 405.

modified the original method by using cultures of *S. cruzi*. If the specificity of the reaction can be established it may solve the question of the relation of this form of trypanosomiasis to thyroid and heart disease, and, as the mouse-protection test has done in yellow fever, may enable the exact distribution of infection to be mapped out. So far human infection is thought to be confined to certain parts of South America (Argentina, Brazil, Guatemala, Paraguay, Peru, Salvador, Uruguay, Venezuela and Chile), Panama and Mexico, but the distribution of the potential insect vector, certain reduviid bugs, is much wider throughout the world, and, even more significant, natural infection with *S. cruzi* has been demonstrated in three species of these bugs collected in North America. Kofoid and Whitaker [5] have described naturally infected *Triatoma protracta* and *T. uhleri* from Arizona and California, and Packchanian [6] has demonstrated the trypanosome in *T. gerstakeri* collected in Texas. It remains to be seen whether further investigations will reveal widely distributed human infections.

ACCIDENT PRONENESS AMONG MOTOR DRIVERS

HOWEVER well machinery is guarded or roads are constructed the individual differences between those using them still remain. Whether those differences can be measured and detected before rather than after the individual has revealed his propensity to accidents is clearly an important question. Following up their previous studies of accident proneness in factory workers E. Farmer and E. G. Chambers have turned their attention to motor drivers.[7] They find, as indeed everyday observation would suggest, that as in the factory so on the roads people are not equally liable to suffer accidents. Further, experience, although it lessens the accident-rate, does not obliterate these personal differences. For instance, 45 London omnibus drivers who had no accidents in their first year of work had, on the average, 4·7 each in the next four years; 14 who had 5 to 8 accidents in their first year suffered an average of 10·4 in the same subsequent period, or rather more than twice as many (trivial as well as serious accidents are, of course, included). That difference suggests one way of eliminating the accident-prone—on the basis of their record in some initial period of exposure. But it may be an expensive way, since the initial period may give rise to a serious accident, and also it may act unfairly since what is true of the average is not necessarily true of the individual. Thus the protocols published by Farmer and Chambers show that of two men, both of whom had no accidents in their first year, one had no accident at all in the subsequent four years while the other had as many as 11; similarly, one who had 8 accidents in the first year had only 5 more, while one who had 7 in the first year experienced another 14. Initial experience alone is clearly not a sufficient guide. The alternative, or, better still, supplementary, method is the use of psychological tests. The most informative of the groups examined by Farmer and Chambers shows that those who did best in their æsthetokinetic tests had an accident-rate 30 per cent. lower than those who did worst. On the other hand, if the worst 25 per cent. had been refused entry the accident-rate would have been reduced only 7 per cent. If, in addition, all those who had had 3 or more accidents in their first year had been eliminated, still only 13 per cent. of the subsequent accidents would have been prevented and at the cost of removing 44 per cent. of the drivers. This is clearly not practical politics and the search for simple tests more closely correlated with accident proneness must continue. Following up one line Farmer and Chambers find, from a test of brake-reaction times, that an average of half a second is required to remove the foot from one pedal (accelerator) and place it on another (foot-brake) at a sudden signal—that is, even without the mental processes needed in practice to decide what it is best to do. With this reaction-time in the driver a car travelling at 30 miles an hour would move 22 feet before the brake was even applied. There is no direct evidence that those with a slow brake-reaction time have an undue number of accidents, but it seems likely that they do.

5. *J. Parasit.* 1936, **22**, 259.
6. *Publ. Hlth Rep., Wash.* 1939, **54**, 1547.
7. A study of accident proneness among motor drivers. *Ind. Hlth Res. Brd Report* No. 84, 1939. H.M. Stationery Office. Pp. 47. 9*d*.

FAULTY DETOXICATION IN SCHIZOPHRENIA

IT has several times been suggested that the detoxicating mechanisms of the liver may be impaired in schizophrenia, leading to an accumulation of toxic amines, which may have an inhibiting effect on the respiration of the nervous system similar to that of narcotics. The test mainly used in the estimation of this impairment is that described by Quick, depending on the ability of the liver to detoxicate benzoic acid by conjugating it with glycine to form hippuric acid. Sodium benzoate is given by mouth and the amount of hippuric acid excreted in the next four hours is then measured. In 1938 Quastel and Wales [1] found that all of 18 cases of catatonia showed a lowered excretion of hippuric acid in this test. Ström-Olsen, Greville and Lennon,[2] on the other hand, found a lowered excretion in only 5 out of 28 catatonics. In schizophrenics other than catatonics their results tallied closely, the percentage with a lowered excretion being 15 in Quastel's series and 18 in Ström-Olsen's. This largely ruled out the possible factor of differences in technique. In two papers on this subject in this issue Quastel and Wales report fresh results corroborating their previous findings, while Davies and Hughes also support them. In the first two papers both renal and hepatic factors were ruled out, and now Quastel and Wales have gone further and eliminated the variable of absorption from the gut by measuring excretion after intravenous injection of sodium benzoate. The results obtained were the same as with the oral route. All of the catatonic patients examined exhibited decreased excretion, while only 19 per cent. of the other schizophrenics did so. Davies and Hughes, giving the sodium benzoate by mouth, agreed in finding a lowered excretion in nearly all their catatonics, but in other schizophrenics their figure was much higher than that of Quastel and Wales—namely, 54 per cent. In general groups of patients, including a variety of mental disorders, both papers record a fairly high incidence of subnormal excretion, the findings being 45 and 37 per cent.

By repeated examinations Quastel and Wales demonstrated that the excretion of hippuric acid in catatonic patients varies with their condition. When they have been improved by Cardiazol treatment their excretion rises to within normal limits, to fall again if there is a relapse. This variation may partially explain discrepancies in results. Davies and Hughes also adduce evidence in 3 cases which supports this correlation of hippuric-acid excretion with mental condition. In this connexion it is of interest to note Gjessing's [3] work on the nitrogen balance in catatonia

1. Quastel, J. H. and Wales, W. T. *Lancet*, 1938, **2**, 301.
2. Ström-Olsen, R., Greville, G. D. and Lennon, R. W. *Ibid*, p. 995.
3. Gjessing, R. *J. ment. Sci.* 1938, **84**, 608.

with a periodic course. He finds that two types of course exist. In one the onset of stupor follows on the attainment of a maximum nitrogen retention; in the other it comes on when nitrogen storage is at a minimum and nitrogen excretion at a maximum. It seems possible that in a phase when nitrogen retention is high the detoxication of benzoic acid by linkage with glycine might be disturbed because less glycine is available. There is probably a wide range of metabolic disturbances in schizophrenia, and we are as yet only in the initial stages of their investigation.

FLUSHING OUT THE BILIARY DUCTS

Best, Hicken and Finlayson[1] of Omaha have evolved a method of increasing biliary pressure so as to flush blood-clot, mucus, biliary sand and small stones from the common duct without operation. After experiment they used the commercial preparations of dehydrocholic acid, Decholin and Procholin, which were given by mouth, and Decholin sodium, which was given by intravenous injection. The patients studied were convalescing from cholecystectomy and choledochostomy. At the time of operation a T-tube had been placed in the common duct and brought out through a separate stab wound. The tube was connected to a manometer and a reservoir containing sterile normal saline. They were able to measure the "break" pressure which overcame the resistance of the sphincter. Further observations were made on the changes of pressure in the duct system itself, and these were followed for several days. It was found that the pressure in the common duct varied between 50 and 125 mm. of water during the different phases of digestion. The intake of food caused an immediate rise which reached its maximum in fifteen minutes. Fats seemed to cause the most effective relaxation of the sphincter musculature. If the rise in pressure after food is due to closure or tightening of the sphincter, this may be the cause of the postprandial distress in affections of the gall-bladder and biliary tract, and of symptoms which sometimes follow cholecystectomy. The liver secretory pressure and the amount of bile arising at the source in the liver are other factors which affect the pressure within the ducts, and it is these factors which the dehydrocholic acid derivatives alter. When they were given by mouth there was a definite increase in duct pressure of 25–75 mm. of water. After giving the drug for three to five days the intraductal pressure often dropped, possibly because of a relaxation of the sphincter in response to the increased flow of bile. Withdrawal of the drug for a few days, followed by its readministration, gave an increase in pressure, but not usually to the previous level. The most striking rise in pressure was obtained by intravenous administration of decholin sodium. The rise here was immediate, but it lasted for only 10–30 minutes and was not so high as when the drug was given by mouth. Small hepatic stones were dislodged from the duct by the following three-day routine. Three or four tablets of decholin (gr. 3¾) or procholin were given four times a day for three days. On the first and third days gr. 1/100 of nitroglycerine was dissolved under the tongue; on the intermediate day gr. 1/150–1/100 of atropine was given by mouth or by hypodermic injection three times. The patient was given one or two drachms of magnesium sulphate in water every morning before breakfast, and an ounce of cream or olive oil in the evening. The method causes an increased flow of bile which works the debris down the duct while the sphincter is relaxed. If a T-tube is present the common duct is also irrigated each day with warm sterile water or iodised oil. The regime is recommended after operation and also in the medical treatment of disease of the biliary tract, but it is not suitable for cases of jaundice with complete obstruction of the common duct.

1. Best, R. R., Hicken, N. F. and Finlayson, A. I. *Ann. Surg.* 1939, **110**, 67.

TRANSMISSION OF TUBERCULOSIS FROM MAN TO CATTLE

THE transmission of tuberculosis from cattle to man is so much more important than the reverse that the possibility of dairy cattle being infected by their attendants will be a new conception to many. It is true that the Public Health (Prevention of Tuberculosis) Regulations of 1925 prohibit the employment in a dairy of persons suffering from respiratory tuberculosis, but this clause was probably intended primarily to guard against direct infection of the milk. Nielsen and Plum[1] of the State Veterinary Serum Laboratory of Copenhagen have now recorded instances of infection of cattle by tuberculous persons employed on farms in Denmark. Farms which had been free from tuberculin reactors revealed without warning a surprising number of positive reactors, suggesting the sudden appearance of an unexpected focus of infection in their midst. To give one instance, a herd which had been free from tuberculosis since 1932 suddenly yielded 19 positive reactors out of 29 cattle. On investigation a farm hand was discovered who had been previously vigorous and apparently healthy, but who was later admitted to hospital and subsequently transferred to a sanatorium. The records in the other farms quoted in the paper are similar. There were 17 farms in all, and in 13 of these a worker suffering from tuberculosis was found from whom the bovine strain of the tubercle bacillus was isolated. In one instance a human-type strain was obtained from a worker, in two others the strain had not been typed, and in the remaining case the strain though bovine might conceivably have reached the herd during transport. Reid[2] has also recorded an instance in this country of a heifer infected with the human type of bacillus and cites two more from the literature published by A. S. Griffith in 1913. In only one of these three, however, was contact with a phthisical person established—one of Griffith's cases. Griffith[3] has discussed the question of cattle contacts from the point of view of direct transmission of bovine tubercle bacilli from cattle to man by contact. This possibility having now been well established there seems no inherent reason why the reverse process should not occasionally take place.

At the Cambridge University by-election, of which the result was announced last Saturday, Dr. A. V. HILL, F.R.S. (Independent Conservative), was returned by 9840 votes against 5386 votes cast for Prof. J. A. RYLE (Independent Progressive).

On Thursday, March 14, at 4 P.M., Mr. ERNEST HEY GROVES will deliver the first Moynihan lecture to the Royal College of Surgeons of England. His subject will be the Life and Work of Moynihan.

1. Nielsen, F. W. and Plum, N. *Veterin. J.* January, 1940, p. 6.
2. Reid, J. *J. comp. Path. Therap.* 1939, **52**, 318.
3. *Tubercle*, 1936–37, **18**, 529.

SPECIAL ARTICLES

MEDICAL EDUCATION OF THE FUTURE

By Sir John Parsons, F.R.C.S., F.R.S.

The decentralisation of the hospitals of large towns has long been a subject of discussion, chiefly with a view to improving the environment of the patients. The anticipation of sudden and wholesale air-raids at the outbreak of war led to an elaborate scheme for almost complete evacuation of municipal hospital beds. This scheme had many of the characteristics of hasty legislation, dominated by fixed ideas, with which we have since become so familiar. Owing to this lack of reasoned foresight it has had to be profoundly modified. It has, however, afforded a crude example of some of the effects of wholesale decentralisation, and though many of these have been disastrous—especially in the penalisation of the normal civilian population—these defects should not be overestimated owing to the abnormality of the circumstances. As Sir Frederick Menzies has remarked, it would seem that this is "not an appropriate moment for the discussion, much less the formulation, of any sort of comprehensive scheme of hospital services of this country, whether voluntary or municipal"; yet perhaps there are some advantages in ventilating the subject at a time when feelings run high and speech is unbridled, especially as it is quite certain that definite formulation and pragmatic sanction will not be given to any such scheme in the immediate future. Moreover, your special commissioner's Plan for British Hospitals and the correspondence to which it has given rise have already exposed the diversity of opinions, and, much more important, certain factors of fundamental importance, each of which demands prolonged and careful consideration before it can be fitted into a satisfactory comprehensive scheme.

One of the most ominous signs which has been revealed is the tendency displayed to advocate revolutionary rather than evolutionary measures, a tendency which is ever present, but which is exaggerated at a time when the psychology of the herd is in the ascendant. The warning cannot be too strongly or too often urged that no effort should be spared to retain all that is best in the present system and to adapt it so far as is possible to altered environmental conditions.

UNIQUE POSITION OF TEACHING HOSPITALS

In the welter of conflicting views which have been expressed, although there are many references to medical teaching and many diverse recommendations for its reform, one looks in vain for emphasis on the profoundly important fact that the teaching hospitals occupy a unique position. Fifty or sixty years ago British medical education set an example to the whole world. Medical students gathered together in relatively few centres—London, Edinburgh, Leeds, &c. In all such centres the hospital staff regarded the duty of teaching to be as obligatory as the duty of treating the patients. Here as in no other part of the world students were brought into intimate contact with the patients—the sine qua non of good clinical teaching. These centres were chosen, or more accurately inevitably became segregated, because of the wealth of clinical material available in them. For the same reason it is surely an absolutely fundamental principle of any future scheme that the teaching hospitals, so far as they cater for undergraduate students, remain within the metropolitan or urban areas. Under no other condition can a sufficient variety of clinical material be provided. Moreover, with the present curriculum, and indeed with any adequate curriculum which can be suggested, the waste of time involved in any plan of decentralisation renders such a plan nugatory.

The question of the curriculum seems to have been curiously overlooked in the Plan for British Hospitals and by its critics. Yet it too is a fundamental factor. Everybody admits that the curriculum is overloaded, yet the inevitable growth of specialism in every branch of medicine and surgery tends still further to add to the burden; for experts, in their enthusiasm, are liable to overestimate the importance of their own subjects, losing sight of the wood amid the multitude of trees. The unwitting aim of the present curriculum would seem to be to create a body of supermen who are universal experts in all branches of medicine. Fortunately, medical students are on the whole exceptionally intelligent, and for the most part succeed in outwitting their expert examiners to the effect that a large proportion become "qualified." Qualified for what? Theoretically to become first-class general practitioners, for it is the primary function of the doctor to diagnose disease, and to fulfil this function he must have a broad view of the subject and good judgment in estimating the relative importance of signs and symptoms.

It is true that British medical schools turn out as good, if not better, men than any other country. Yet do they turn out the best type of general practitioner? Sir Maurice Cassidy's experience affords some information. "I join issue with him (your special commissioner) at once when he asserts that each year more and more of the first-rate students go into general practice. This is not at all my experience. In fact, when my general practitioner friends ask me to find them a promising assistant or partner I am rarely successful in my search." Doubtless there are other causes besides the shortcomings of the curriculum which lead men to eschew general practice. The crucial question is this: "Is the present curriculum that best designed to form the best foundation, not only for general practice, but also for any other kind of medical practice?"—for the best foundation for any form of specialist practice is also that wide synoptic view of the whole subject which every well-qualified medical man should possess.

THE QUESTION OF SPECIALISM

At present the curriculum tries to cater for both general practitioners and consultants, i.e., specialists. This remark, of course, raises the vexed question of specialism. It has already been necessary to utter a warning against the unreasoning activities of the herd instinct. It is now necessary to attempt to shatter that illogical "cake of custom" which is the prerogative of the die-hard. Only a few years ago a distinguished surgeon who had made a name for himself as a brain surgeon was intensely indignant with me for calling him a neurologist. The time has surely come to recognise that the days of the Admirable Crichton are gone for ever. The growth of knowledge has made specialism imperative in every branch of science, and every physician or surgeon is already a specialist however "general" he may be. However much this may be denied in words, it is quite patent in action, for no-one becomes a consultant without qualifying himself to be one by postgraduate study.

The logical conclusion, therefore, is that the qualifying curriculum and examinations should be strictly designed to turn out the best type of general practitioner. If this were done the successful examinee would be better qualified to go with the minimum delay into general practice, and those proceeding to postgraduate courses would be provided with a better perspective for future specialisation. By this means alone is it possible to lighten the burden of the medical student by pruning the curriculum, thus relieving him of a year's work, and providing the postgraduate student with an extra year for study.

Many will say that it is impossible to prune the curriculum without disastrous results. This is a fallacy, for at present many hours which might be better employed are spent in getting a smattering of subjects which it is extremely improbable that the student himself will ever need to use. The fallacy depends largely upon the old-fashioned idea that it is impossible to teach applied science scientifically except on an elaborate basis of pure science; yet there are thousands of physicists and engineers who can use the calculus practically without any profound knowledge of pure mathematics, and thousands of people who make good use of instruments the workings of which they do not understand.

EXPANSION OF POSTGRADUATE TEACHING

It is clear that if such a qualifying curriculum and examinations were instituted there would be need for considerable expansion of postgraduate teaching by medical schools, every one of which would have to cater for both undergraduate and postgraduate teaching. The problem of postgraduate teaching can only be satisfactorily solved by some such extension. The attempts which have hitherto been made by the Fellowship of Medicine and the British Postgraduate Medical School are lamentably inadequate. So far as refresher courses are concerned they supply a felt want, but even in this respect only to a limited degree. In most cases the serious postgraduate wishes to work under some particular teacher, often one attached to his old hospital, certainly not under a teacher who has been chosen for him and of whom he may never before have heard. In the present circumstances if he succeeds in getting into classes in his own school he is a fish out of water and a nuisance in undergraduate classes. All the requirements of postgraduates would be adequately supplied if every teaching hospital had postgraduate courses and clinical appointments.

On such a scheme there would be less dislocation of existing conditions than might at first be thought, and examining bodies would certainly not suffer financially. In the presence of so many colleges and universities now conferring qualifying diplomas and degrees it would be impracticable to institute a one-portal examination. There is, however, no reason why the existing examinations should not be adapted to the new conditions and higher examinations instituted if necessary for postgraduate students not already catered for.

AIM OF A MODIFIED CURRICULUM

If the suggestions advocated in the foregoing résumé be accepted, it remains to consider the modifications which must be made in the curriculum. In this respect the fundamental principle which must permeate the whole curriculum is that every subject shall be taught with the ultimate aim of producing a first-class general practitioner kept steadily in view. Thus in the teaching of anatomy and physiology at present the student is expected to learn anatomical minutiæ and physiological details which are useless to the general practitioner. Even in their relationship to the requirements of specialists, though all of them may be useful to various specialists, they are not all useful to every specialist, and hence they can well be relegated to postgraduate study. The anatomy and physiology syllabuses should therefore be drastically revised, not by professed anatomists and physiologists, but by surgeons, physicians and general practitioners who are conversant with the requirements of clinical medicine. It is probable that in these and other subjects new and carefully expurgated textbooks would be helpful. The same remarks apply to bacteriology and to a less extent to some other subjects. It is, however, in the practical laboratory classes that most time could probably be saved. This suggestion applies least to anatomy, though even there dissections need not be so minute as is customary and more use might be made of specimens specially prepared to demonstrate anatomical relations of most importance to the general practitioner. More time can be saved in the practical classes on physiology, histology and bacteriology. No general practitioner and very few consultants cut their own sections, make their own cultures, or do their own Wassermanns, and there is no good reason why the student should waste his time doing what he cannot do efficiently. The same principle applies to clinical laboratory investigations. The student should be compelled in the first instance to examine patients and make tentative diagnoses without the aid of elaborate clinical, laboratory and other tests. Having done so he should learn what further specialist examinations, and what special laboratory investigations are indicated for the more complete elucidation of the cases.

Only the briefest outline of what can be done to revise the curriculum and lighten the student's burden is indicated here, because so complicated a problem needs the thoughtful consideration of those fully au fait with medical teaching, and with knowledge which I candidly confess I do not possess.

The clinical teaching of undergraduate students should be entirely in the hands of those members of the visiting staff who are in active private practice. They at least have some knowledge of how to deal with patients other than the ordinary hospital patient. Even their experience is not ideal for the purpose and it would be an excellent innovation if good general practitioners could be attached to the staff to instruct the students in the routine of general practice and the manifold vagaries of private patients. Only those who, like the writer, have had a few years' experience of general practice can appreciate the inestimable advantage in dealing with patients as a consultant; and only they can realise the faux pas which the best of consultants can make in the presence of private patients.

WHOLE-TIME UNITS

It was a deplorable mistake by the Board of Education to put the control of undergraduate teaching in the hands of whole-time units. These should be confined to research work and postgraduate teaching. The unit system is admirable in its proper sphere. It accounted more than anything else for the success of the Johns Hopkins Hospital in Baltimore some years ago, but carried to excess, as it was in that hospital, it inevitably broke down and had to be modified. In my opinion the whole-time professor should be entirely a research worker and postgraduate teacher. He will, therefore, belong to the type of man, like the physiologist or other pure-science professor, who through love of research is willing to live on a moderate income. It can only very rarely be the case that such a man will devote himself to surgery or obstetrics. Hence these should be part-time professors, and the only whole-time ones should be those of

medicine and such branches of medicine as attract the same type of man as the physiologist. Hence the appointment of whole-time professors should be made by the Medical Research Council and not by the Board of Education.

CONTROL OF MEDICAL EDUCATION

The control of the curriculum and the assessment of examinations is carried out by the General Medical Council, and is doubtless very efficiently performed. This body fulfils two functions—that of controlling medical education and that of exercising a censorship of medical ethics. It would be rather remarkable if any group of men could be selected which would fulfil two such disparate functions with equal and optimal success. In my opinion the General Medical Council should be replaced by two separate bodies. The invidious function of trying penal cases by the victims' own colleagues should be allotted to a properly constituted legal court, presided over by a judge of at least the standing of a county court judge, assisted by medical assessors—in fact, a court constituted, mutatis mutandis, like the Admiralty Court.

The control of medical education should be in the hands of a council specially selected for that purpose alone. Under the new conditions its functions would be not only to ensure a high standard, but also to ensure that the qualifying examinations should be confined to the essential requirements of sound general practice. For the latter purpose it should number among its members general practitioners of wide experience. For the higher postgraduate examinations committees should be appointed to report to and confer with the council.

It is clear that such a scheme as that presented here would require very careful and prolonged consideration. It is doubtful, indeed, if it could materialise at all except under the ægis of a Royal Commission, especially if it were made to form part of the wider Plan for British Hospitals. If, however, it be conceded that the teaching hospitals remain as now in metropolitan or urban centres, there is no reason why the scheme should not be dealt with independently, and there is no reason why preliminary investigations should not be set on foot at once.

LEPROSY IN BRITISH AFRICA

EXCEPT among nomadic desert tribes leprosy is endemic to a greater or less extent in every part of Africa, and the incidence rises to as much as 4 per cent. of the inhabitants in some places. Last summer Dr. Ernest Muir, medical secretary of the British Empire Leprosy Relief Association, visited Nyasaland, the Rhodesias, the Union of South Africa and Nigeria to study what is being done there for the relief and control of leprosy and to investigate its causes.[1] Contrary to what might perhaps be expected, the severity of the disease does not even roughly correspond to its frequency. This is explained on the hypothesis that only a small minority of the population are highly susceptible, and that most of the severe open cases are from among them. But in a community which lives in congested and insanitary conditions and in which all kinds of promiscuousness are practised, the frequency and closeness of contact leads to repeated infection which breaks down the natural resistance of many of the non-sensitive majority; in those, however, infection gives rise as a rule only to the milder closed neural type of the disease. Thus in Barotseland, where these unfavourable conditions prevail, only 11 per cent. of lepers were of the severe open type; whereas in Nyasaland, where the people are better educated and more sanitary in their habits, there were 35 per cent. of that type. This large proportion of severe cases was, however, accompanied by a much smaller total incidence, the number affected from among the resistant section of the community being comparatively small. At the Pretoria institution, where there are both European and Bantu patients, it was possible to make a comparison of the proportions of the types of leprosy in the two communities. Almost all the Europeans suffered from the severe open type, but only 25 per cent. of the natives. At first sight this suggests greater racial susceptibility among the Europeans, and it is supported by the fact that among another European group of lepers, those in the Cyprus leper farm, 98 per cent. of the patients were of the same severe type.

Different methods of dealing with leprosy are adopted in these different countries. Thus, in South Africa, where up to £125,000 a year is spent on leprosy control, the system is a compulsory one, and all cases are confined in one or other of the five Government institutions. In most of these, however, the good treatment of the patients has made the institutions popular, the patients come in willingly, and the Leper Act has seldom to be invoked. In the last twenty years no fewer than 4502 patients have been discharged with disease arrested, and of these 2738 have already been entirely freed after a further period of surveillance. A system similar to that of the Union is practised in Basutoland. In Southern Rhodesia excellent results are obtained by treatment at the Government institution at Ngomahuru. Here even the severe lepromatous form yields to treatment, an uncommon occurrence elsewhere. It is considered that the climate, which though sufficiently warm is dry and invigorating, is largely responsible for these good results. In consequence there is a proposal on foot that a British National Leprosarium should be established there for private leprosy patients from other parts of the Empire. In Nyasaland and Northern Rhodesia anti-leprosy work is chiefly in the hands of missions who treat comparatively small numbers of patients in numerous leper camps scattered over these countries. While this work is undertaken with much devotion the medical superintendence is not always adequate, and more satisfactory results could be obtained with more financial help and more expert supervision. The tour in Nigeria included most of the principal leprosy institutions. It is calculated that there are between two and four hundred thousand lepers in Nigeria. While many of these are in the Northern Provinces the main seat of incidence is among the Ibo and Effic-speaking peoples of the south-east. Here an excellent coöperative scheme exists between Government, Native Administrations and missions. The last of these are responsible for running these institutions while the first two supply most of the funds. The approved scheme includes a large central leprosarium in each province in the form of an agricultural colony. But since with such large numbers it is impossible to include in an institution more than a fraction of all the lepers in a province, village centres are being formed where after a survey all lepers are isolated at a distance from the village and treatment is supplied. All this is carried out under the superintendence of the leprosarium doctor and his assistants. Ex-lepers who have been trained during their time of treatment in the institution are stationed in these villages to help as dressers and

1. *Leprosy Rev.* January, 1940, p. 3.

general advisers, and to insure that careful segregation is observed. This system is very popular, one village vying with another in making it successful. It is on a non-compulsory basis, except in so far as the informed public opinion of the village forces any unwilling patient to coöperate. The British Empire Leprosy Relief Association has supplied a number of doctors and lay workers (the latter with the help of Toc H) who take an important part in this work, chiefly in Nigeria, but also in other countries.

The tour also included the inspection of an important leprosarium in the Katanga province of the Belgian Congo, and finished up with a short visit to Cyprus where, though leprosy is not looked upon as one of the most serious public-health problems of the island, it is one which might be brought under complete control in a comparatively short time if a serious and continuous effort were made.

OUTPUT AND HEALTH

LESSONS OF THE LAST WAR

IN September, 1915, the Health of Munition Workers Committee was appointed "to consider and advise in questions of industrial fatigue, hours of labour, and other matters affecting the personal health and efficiency of the workers in munition factories and workshops," and in 1918 the final report, addressed to Mr. Winston Churchill, then minister of munitions, was published.

LAW OF DIMINISHING RETURNS

In estimating how the maximal output of munitions should be produced it was argued that, if one unit of work could be done in 1 hour, twelve would be done in 12 hours, and so on. The rate of output, however, decreased and sickness-absence, lost time, and discontent increased. The immediate problem was that of fatigue.

"At a very early stage of the war the ordinary restrictions on hours of employment were widely relaxed. Sunday labour, previously forbidden for women and young persons and practically unknown for men except for a few continuous processes became common. The employment of men for 70–90 hours a week was common, for more than 90 was not infrequent, and there were cases of hours in excess of 100" (Final Report of the Health of Munition Workers Committee, 1918).

The committee used two methods to obtain information: (1) it took evidence from people in direct contact with munition workers, and (2) it appointed investigators to obtain scientific data. The evidence of people in direct contact showed that the hours worked imposed too severe a strain on the workers and on the management, and that the rate of production was not proportional to the increase of hours. The full effect of the long hours had not been felt at first, because patriotism spurred the worker to put out all his efforts and the extra pay enabled him to have better food. Although the witnesses deprecated the long hours, there was no agreement about what constituted a reasonable working day.

To remedy the absence of scientific data Dr. H. M. Vernon and others were appointed to investigate the output and hours worked in various munition factories over some months. Within limits three times as much work will be done in three hours as in one, and six times as much in six; but at some point the law of diminishing returns comes in. Vernon showed that in one factory decreasing the hours from 67 to 57 a week led to an increase of gross output of 22 per cent., and in another group reducing the hours from 75 to 59 led to an increase of 11 per cent.

"The nation cannot afford the extravagance of paying for work done during incapacity from fatigue merely because so many hours are spent on it, or the further extravagance of urging armies of workmen towards relative incapacity by neglect of physiological law."

Nor does the effect of long-continued fatigue end immediately after a reduction of hours has taken place; it may take from two to thirteen months after the reduction before the increasing output attains a steady level.

ACCIDENTS AND SICKNESS

Besides the effect on output it was found that the accident-rate was related to hours of work. When the 12-hour day was worked, the accidents incurred by one group of workers were two and a half times more numerous than in the subsequent period when the daily hours were reduced to 10. Although there was a general impression that absence due to sickness was increased when the long hours were worked, the committee found a quantitative estimate impossible; but they concluded that the amount of such absence was considerably underestimated. The principal forms of illness reported by the medical practitioners were headache, footache, muscular pains, sleepiness on night shifts, and nervous symptoms; women had in addition indigestion and anæmia. More recent investigations confirm the prevalence of these illnesses in industry, but the omission of diseases of the upper respiratory tract is surprising.

THE FACTORS ANALYSED

Since the end of the last war the work begun by the Health of Munition Workers Committee has been continued by the Industrial Health Research Board and for some at least of the problems definite knowledge has replaced impressions or surmise.

There is now a much wider recognition of the importance of a reasonably shorter working week, both for health and efficiency; an increasing number of firms have adopted the five-day week; more recently the value of holidays has been recognised. Wyatt showed that there was an increase in output during the weeks preceding the annual holiday. Work done by the Industrial Health Research Board on the length of shifts shows that within limits an increase of hourly output follows a reduction in the length of the shift. The working day has usually had one break in the middle for dinner, but it is becoming increasingly common to break up the spell of 4½ or 4 hours by a rest. A pause of 5–10 min. about the middle of the spell has been found to increase the output, and, affording opportunity for change of posture and for relaxation, is much appreciated by the workers. Where a conveyor belt is used, a pause of 5 min. every hour is more beneficial than the longer pause in the middle of the spell.

During daylight hours the output is higher than when the work is done in artificial light of relatively low intensity, as used in some factories, and work done in failing light is less efficient. If work has to be done in artificial light for only a few hours each day, visual fatigue is unlikely to occur with an illumination of about 10 foot-candles and an even distribution of light and freedom from glare. Of recent years a much higher standard of lighting has found favour.

Workers in light sedentary occupations prefer an air temperature of 63°–65° F., and many of them feel comfortable over a much wider range. They like an air velocity ranging from about 30 ft. a minute in winter to about 50 ft. in summer.

MITIGATION OF BOREDOM

Diminished efficiency, weariness, and an appearance of listlessness may be present when the work is light and the hours normal. This condition is due not to fatigue but to absence of change; the work is monotonous and the worker is bored. Many of the modern methods of industrial production have led to an increase of repetitive work. It must not be assumed that all workers find all repetitive processes boring, but it has been established that about 26 per cent. of workers experience considerable boredom on repetitive work. Since the repetitive work has to be accepted, the change lacking in the work must be introduced into the conditions. Some of the boredom can be mitigated by the introduction of more frequent rests, by training workers when young to do more than one job or by allowing singing or gramophone music. Although it is not possible to prove that monotonous work results in a higher sickness-rate, in organisations where there are prospects of change and where the general mental atmosphere is stimulating there is a lower sickness-rate than in others.

The development of intelligence and vocational testing has opened up a new field in regard to selection of people for the most suitable work, thus preventing many misfits.

The investigations which started with hours of labour have led research workers along unexpected paths. Whereas some of the problems inherited from the original committee can now be at least partially answered, many still remain unsolved.

IRELAND

(FROM OUR OWN CORRESPONDENT)

THE MEDICAL PROFESSION AND THE GOVERNMENT

FOR some years the relations between the Irish Medical Union and the government have been becoming more strained, and the central council of the union has now advised its members to decline giving any further gratuitous assistance to the government or to local authorities working under state control. This step has not been taken without reluctance or long consideration. The union has always been eager to coöperate fully with the government in all matters concerning the public health, just as is done in Great Britain by the British Medical Association, to which the Irish Medical Union is affiliated. Its overtures have, however, been received with coldness, and in many cases in which it offered advice it has been treated with a discourtesy which almost amounted to contempt. There is, indeed, great discontent in all the medical services related to the government. An unfortunate dispute over the remuneration to be given by local authorities to dispensary medical officers for carrying out the work of immunisation against diphtheria has now gone on for several years, the only offer put forward by the Department of Local Government and Public Health being less than half what is paid in Great Britain or Northern Ireland. Last spring the then Minister of Local Government and Public Health made suggestions to the union which were in principle acceptable, and hope was high for a speedy settlement of the unpleasant dispute. Unfortunately the change of ministers in September took place before much progress was made, and the present minister has declined to discuss the subject in person and has delegated the conduct of negotiations to his subordinates. In the meantime the campaign against diphtheria is hampered, although in many counties the medical officers continue to carry on immunisation and are trusting to the future for payment.

The conditions of the Army Medical Services have been made progressively worse in the last few years. A pensions scheme for army medical officers was long overdue, but when one was introduced some fifteen months ago it was found to be worse than the most gloomy anticipations. Pensions were fixed without any relation to pay at the time of retirement, being related solely to rank, and only a trivial difference was made between medical officers and the ordinary military officers. Strong protest was made by the Medical Union but was met by a curt refusal to reconsider the matter. Moreover, immediately afterwards, a regulation was issued making substantial reductions in the scale of rates of pay, and again treating medical officers on almost the same terms as military officers. Representations on this subject having also failed, the union advised its junior members to refrain from entering the Army Medical Service until satisfactory rates of pay and pension were adopted. No improvement has since been made.

The case of medical civil servants, such as medical inspectors of the Department of Local Government and Public Health, has also occupied the attention of the Irish Medical Union. On this point, with a curious inconsistency, the government refused to permit the union to make any representations. The conditions of these appointments have been so unattractive that it has been difficult to find suitable candidates, and vacancies have remained unfilled for many months.

The coldness shown by the several government departments to all offers of coöperation from the medical profession and the refusal to make any serious attempt to remedy its grievances have forced the medical union to reconsider its own attitude, but before taking any decisive step it decided to place the position before the Prime Minister, in the hope that he might use his influence to bring about a friendly attitude on the part of his ministerial colleagues. Accordingly, last October the union addressed a letter to Mr. De Valera, repeating its offer of cordial coöperation and requesting that existing grievances should be considered. In his reply the Prime Minister ignored completely the offer of coöperation and adopted a negative attitude in regard to the other questions raised.

In a recent number of the *Journal of the Irish Free State Medical Union* it is claimed that if the union cannot have coöperation it will not be content with exploitation. In this spirit the central council has decided to advise members to withdraw their gratuitous services. Members have been giving much gratuitous help to government departments and to local authorities. The most notable example was in regard to the manning of selection boards of the Local Appointments Commission. For several years all appointments under local authorities have been made on the recommendation of this commission, acting on the advice of a selection board, which in the case of medical appointments was composed mainly of medical men. These gentlemen gave their services for nothing, and the demand on their time was often considerable. There seemed to be no justification for failure to pay suitable fees for this attendance, for the candidates had to pay for permission to present themselves for an interview. The officers of local authorities also made frequent use of the good offices of practitioners for information outside any contractual obligations. These points must be considered in detail, but in the first instance the medical union has requested medical men to decline their help to selection boards.

The position is unhealthy, but the union appears to have shown persistent patience in the face of continuous discouragement, and it is not easy to see what other steps it could have taken. There is, of course, no intention to hamper the work of private charity or benevolent organisations, but only to refuse coöperation with activities for which the state or local authorities are responsible.

DENMARK

(FROM AN OCCASIONAL CORRESPONDENT)

THE RED CROSS AMBULANCE FOR FINLAND

IT is impossible to give an adequate impression of the enthusiasm throughout Denmark with which funds have been collected for the ambulance unit sent to Finland. It is under the experienced supervision of Professor Chievitz, and is staffed by the best surgical talent Denmark can provide. Denmark has also sent 4 private ambulances and 50 motor-lorries, not to mention many railway trucks crammed with clothing and farm produce. The journal of the Danish Medical Association has issued an appeal to every Danish doctor for a subscription of Kr.10 which, it was hoped, would yield a round sum of Kr.20,000 for the ambulance. One Danish doctor wrote to the editor protesting against the appeal, saying that it was at variance with the non-political and neutral attitude appropriate to the association, and that there were plenty of poor folk in Denmark who would have good use for the money. The letter seems to have had just the opposite of the effect intended; for not only have subscriptions poured in till the desired Kr.20,000 was exceeded by more than Kr.7000 but a substantial sum has been ear-marked as a protest against the letter.

LEGAL CLAIMS OF PATIENTS

In a discussion of this perennial problem by the Danish Medical Society late last year an eminent barrister quoted figures to show what a positive mania the public has developed for putting in claims against doctors for faulty treatment. As he pointed out, not one such claim was settled in a court of law in the ten-year period 1897–1906, whereas between 1927 and 1936 there were 23 such cases. It is not that the medical profession has become more fallible, but that the public has become more greedily querulous. As soon as he has slipped and broken his leg, the conventionally-minded Dane asks himself: Now, who is going to pay for me? Doctors and even hospitals are too ready to meet him half way, so great is their dread of publicity. This state of affairs, with its atmosphere of plaintive blackmail, has introduced a note of cautious watchfulness into the dealings of the doctor with his patients. If they, for example, cough tubercle bacilli into his face and he contracts fatal tuberculosis, it is bad form for his widow to sue them. But patients are ready enough to turn on their doctor and rend him if they see the smallest chance of profit. For some years an organisation known as the Medico-Legal Council (Retslaegeraadet) has been in operation as the outcome of this mania for claiming compensation. Among its seven members are two psychiatrists and the professor of jurisprudence. If a claim is not settled in private it is brought before this council, whose judgments have come to rank with those of Solomon. In the period 1923–37 it rejected about 73 per cent. of the claims brought to its notice, but this does not seem to have discouraged the claim-loving public.

MEDICINE AND THE LAW

Workmen's Compensation

THE huge sums spent on the endless litigation over a few fundamental words in the Workmen's Compensation Act might far more profitably have been applied to the prevention and remedy of injuries and diseases and to the rehabilitation of the disabled employee. When the employer was made liable to compensate for personal injury by "accident arising out of and in the course of the employment," irrespective of any allegation of negligence or breach of duty, he became in effect the insurer of his men. The sponsors of the new law optimistically asserted that recourse to the law-courts would no longer be necessary. It is notorious that no other phrase has ever given the judges so much work. In addition to the sterile expenditure involved in elucidating the words, the workman's recovery is seldom expedited by the delay and uncertainty which attend the settlement of his claim. The words were meant to be general; they have proved to contain a limitation; the time has come to reconsider them.

Workmen's compensation cases seem so often to turn upon some simple issue of law which ought long ago to have been decided. Last week the Court of Appeal had such a point in Seviour *v.* Somerset Collieries. Seviour's duties as a carter took him close to the coal-face; when the shift was over, he had to get back to the bottom of the pit shaft by means of the haulage way. Section 43 of the Coal Mines Act forbade him to use the haulage way while haulage was in motion or to ride on the tubs. Ignoring this statutory precaution for his safety, he rode on a tub, and in so doing received injury to his back, spine and legs. The Frome county-court judge held that his illegal, reckless and dangerous conduct was outside the contract of his employment and barred him from claiming under the act. The decision has been reversed on appeal. Lord Justice Slesser says there was no evidence that the terms of Seviour's employment excluded travelling to and from his work on a tub. It had been held that, if an act was within the sphere of a man's employment, the mere fact that it was prohibited by statute did not take the act outside the sphere of employment; that being so, if there was an accident in the performance of the act it arose out of and in the course of the employment. Even now this litigation is not ended; leave has been given to appeal to the House of Lords. It may be hoped that Seviour's health will be recovered more smoothly than his compensation.

IN "Sex-Problems in War-Time" (London: Student Christian Movement Press. 1940. Pp. 63. 1*s*.) Dr. G. L. Russell makes an earnest attempt to deal with a difficult problem. The book is designed for Army, Navy, and Air Force chaplains. Medical officers will also find it helpful in their dealings with their men, or when they lecture on venereal disease. The first chapter, a third of the whole book, has been issued as a leaflet for "putting in the hands of men and women in the Forces." It is a pity that this section is written in a colloquial style which is jarring to the educated ear. Probably no two people think alike on problems of sex; the book should therefore be used as a guide in the selection of matter and as a stimulus to thought rather than as a textbook from which lectures or teaching may be lifted wholesale. It deals in a moderate way with awkward questions which we all must tackle to-day. It is not the least of the lessons of the book that it helps us to begin to think for ourselves.

IN ENGLAND NOW

A running commentary from our Peripatetic Correspondents

THE medical officer to a large industrial concern is in a unique position to observe the trends of industry. Through the confidence bred of the consulting-room he probably understands more clearly than anyone the real thoughts and feelings, the worries and anxieties, and the health and happiness of the worker while at the same time he is in a position to understand the difficulties and perplexities of the management. If at times he thinks the action of the management is hard and heroic he must equally often realise that nothing short of the heroic can solve the problem, and he must always be impressed by the good-natured way in which the majority of employees face the ups and down meted out to them. The outbreak of war startled industry and created a mild sort of panic which provided some interesting reactions. A large firm engaged on light engineering work found itself faced with the problem of its usual peace-time product becoming almost unnecessary in war-time. Half of the 10,000 employees were therefore suspended pending the arrival of Government contracts. These contracts arrived in due course but required different types of machinery, so most of the old machines—presses, capstans, lathes, drillers, and so on—were taken out and replaced by new machines, very splendid in a "war finish" of grey and red paint. All this took time, and skilled and useful employees being difficult to get at the best of times those suspended were reabsorbed, even though machines were not ready and raw material so scarce that they spent most of the day twiddling their thumbs. Now after a few months of war—six months with very little production—the works is beginning to get into its stride and should soon be adding a useful quota to the country's war effort.

This wasn't what some of us expected. We anticipated that in some mysterious way we should see a change over to war work with everyone working doubly hard in a few days, or at the most a few weeks, and that, with new processes, overtime, air-raids and other calamities of war, sickness and accidents would soon begin to soar. A due warning was therefore sent to the directors reminding them of the evil consequences of excessive overtime, bad ventilation caused by Heath Robinson blackout devices and other things likely to occur in war-time, but they didn't seem to be much moved—probably they were too preoccupied with all their other problems to think seriously of it. They may even have been reassured when in the first months of the war accidents fell so low as to be almost negligible and the sickness-rate became lower than it had ever been. But now in the last month things have taken a turn. All are becoming fully employed and overtime is creeping up, and sickness and accidents are rising rapidly. We wonder this time how long it will be before they become panic-stricken and call on us for help. It is still difficult to convince industrial managements that they can make more use of their medical officer than letting him treat cut fingers and control certain industrial poisonings—that he can give them useful help in employing their men efficiently so as to get maximum output at greater economy and with a minimum of sickness and unhappiness. Some managing directors are thus enlightened, but it is often not fully appreciated that management is not carried out only by a director but also by the works manager, the supervisor, the foreman and the charge-hand. Most of these are recruited from the bench; their education has not included physiology and they have not yet learned that the welfare of their human charges is a more important factor in production than the welfare of the machine. But they are slowly changing. The last war really marked the beginning of industrial welfare and we can already see problems arising which only we medical officers can solve.

* * *

We have been a very happy company in our C.C.S., and as the work was shared out by the existing full-time staff to include the E.M.S. visitors we all had something to occupy us. Students were assigned to us and they penetrated into the remote fastnesses of this large and rambling hospital with the breath-taking rapidity and familiarity which seems the eternal perquisite of medical students. It is a tribute to their engaging manners that they were quickly accepted, medically and socially, in an institution where their like had never previously been known and where no niche existed into which they could immediately be fitted. The medical staff took their duties towards the students very seriously, and were rewarded a few weeks ago when they witnessed the desperate attempts made by their pupils to avoid being transferred elsewhere. The nursing staff also played their part in throwing open their socials to the doctors and students. The night before the students left they performed a "Revue Intime" in traditional fashion. No-one was spared, but no-one could fairly complain, and a good time was had by all. The exodus on the following day was the first event of major importance in our history and one we all mourned. The continuity of the memories shared together of the first hectic days of sandbagging and breathless expectation which now seem so remote were shattered by this mass departure. However, c'est la guerre, and we shall be lucky if no worse befalls us. An excellent innovation here are the study circles formed by the medical staff, one surgical and another medical. We meet periodically and discuss the recent literature—each man is responsible for certain journals—to the benefit and pleasure of all. The long evenings of waiting have been otherwise occupied with darts, bridge and poker for penny points.

Our wonder at the progress of the war has almost disappeared and we are becoming familiar with its topsy-turveydom. One of the E.M.S.-appointed general surgeons is in normal times the visiting otologist. The E.N.T. department is a recent creation; previously the general surgeons somewhat unwillingly tackled such emergencies as were admitted. One of these surgeons, a very modest and shy man, entering a strange ward on some aberrant mission was hailed by a sweet young thing with "Good morning, Mr. S., don't you remember me?" Mr. S politely expressed the opinion that the face was familiar, but, you know, so many patients . . . now, let me see. . . . "Oh, Mr. S, don't you remember, you did my mastoid eight years ago. It was a wonderful job; I've never had any trouble since. Many of my friends have discharging ears in spite of operations. I do think you're clever." Mr. S, in agonised embarrassment, "Splendid, splendid; and what are you in for now?" "Oh, I've had a very bad appendix, but they've made a wonderful job of it. I feel fine and am going home in a few days." "Splendid, splendid," and, still groping his way out, "who did it?" "Oh, Mr. Y, of course" (mentioning the name of the otologist). Exit general surgeon in confusion.

It was just one of those days. The telephone rang almost incessantly and everybody said "come at once." The snow made chains imperative, delaying my start upon, and hindering my progress throughout, an apparently endless round over the worst of our bad roads. In almost every house I visited I was called upon to see a second, third and even fourth patient. Repeatedly sent on from one house to another and frequently bogged in farm lanes I began to think that my day's work would never finish. Every fresh case of influenza looked upon itself as suffering from an unique disease and insisted on describing its symptoms at tedious length; and all the cases already under treatment were quite sure that they were no better. About 4 P.M., having long abandoned all hope of lunch, I punctured one of my (chained) tyres. Nothing, in fact, went right and as wearily I staggered into the surgery, more than half an hour late for surgery hour, I noted with distaste the score or so of patients sitting huddled and coughing gloomily at each other in the dim religious light of the blacked-out waiting-room. Sinking into my chair I called mournfully for the first one and in came Mark Dymond, a lean, middle-aged bronchitic with a twinkle in his eye. "Cor, doctor," he said, "I niver zeed naught like it. They'm like sheep in turnips!" I felt better at once. The apt simile is a great comfort in adversity.

* * *

The economic and "cannon-fodder" arguments against raising a family are much less cogent, to one living in a comparatively small house, than the fact that the room set aside as "doctor's study" has periodically to be converted into a nursery by day and a sitting-room for Nannie (and her nice young soldier) in the evening. This means that doctor has to do his "studying" in the drawing-room where there is no room for his bureau, and his books and papers have to be lodged on the top of the piano. Here they are subjected to frequent dustings by the conscientious housemaid and women have no moral sense about putting things back as they found them. It seems obvious enough that envelopes, notepaper and the address-stamper should be kept fairly close together, but my housemaid thinks otherwise. The writing-pad and envelopes can usually be located without much difficulty but "hunting the address-stamper" has become a parlour-game at once exciting and taxing to the ingenuity. One day it will be on the window-sill, another on the wireless set, a third on the occasional table and I have even found it on the floor under the revolving bookcase. I could, I suppose, "speak to the girl," but as a matter of fact I rather enjoy these hunts.

* * *

For a good many of us students evacuation is now a past experience, and we have settled down to a modified form of pre-war medical life. The Middlesex Hospital has changed in many ways from last August. Quite a number of wards have not been opened up again, though they are quite ready for patients, with beds made and floors swept clean. The top floor of the hospital is still unused and all the operating is done in the emergency theatres on lower floors. In spite of this and the lack of patients quite a number of operations are performed every day. Enough students have remained out of London to man three of the hospitals in our sector. Surgical and medical teams have started again and every day at two o'clock the chief and his flock stream off from the front hall to the wards—an impressive sight. More time than ever is now spent in the lecture-room and many of the lectures have been greatly improved by the liberal showing of cases of interest. This is greatly appreciated, for the outpatient department and the wards often contain more students than cases.

A new feature for most of us is the medical school block which was finished just after war began. It is a four-story building, containing a library and a post-mortem room together with a new biology laboratory. The ground floor has two lecture-rooms and the medical school offices. The library especially is a great improvement, only being rather large there are plenty of people to watch and one's mind wanders very easily. It is also too uncomfortable to sleep in with any enjoyment. At last they have taken down the barricades in front of the hospital and removed the bottles of iodine from the front hall. We can now march in at the front instead of creeping in through the gas curtains at a side door. This goes a long way to making one feel that the hospital is really open again.

PUBLIC HEALTH

Lice

THREE species of louse are parasitic on man—the body louse (*Pediculus humanus corporis*), the head louse (*P. humanus humanus*), and the crab louse (*Phthirius pubis*). The two former are varieties of the same species, but differ in their social, medical and epidemiological attributes. The crab louse is comparatively rare. It chiefly attacks adults in the pubic and anal regions, but may wander to other hairy parts of the body excluding the head. It is spread during sexual intercourse or intimate body contact, but it can be, and is more commonly reported to be, caught from the seats of public water-closets.

The body louse lives on the covered parts of the body and contiguous underclothes. It, or its nits, may be found attached to the body hairs, but it does not infest the head. The louse itself is easily detected, but its nits or eggs may escape detection unless sought in the right places. They are cemented chiefly to the seams of underclothing, especially those touching the armpits and chest. Favourable conditions for lousiness are wearing underclothes night and day, for in these circumstances the eggs hatch in about seven days. Cold delays hatching, so if underclothes are removed at night the rate of generation is slowed down. Ordinary washing in soap and water destroys the lice and nits on underclothing. Generally it may be said that if a person takes a bath and changes his clothes once a fortnight he will not be troubled with body lice. Formerly body lice were commonly found in medical inspection of school-children, but they are now very rare. In London in 1938 only 86 cases of body lice were found in 170,000 children, and in many of the provinces this louse has practically disappeared, though evacuation may give it a chance to re-establish itself. The chief medical interest in the body louse is that it is the spreader of European typhus.

The head louse limits its attention to the hairy scalp. It is a universal parasite and has not been exterminated in any district, so that its habits and habitat are well known. The amount of head-lousiness in the population shows great local variations according to the vigour of the war against it. The main battle-field is adequately manned by the school medical service, but the enemy is continuously reinforced from

the adult population. Factory inspection, where rigidly carried out, attacks a reservoir of reserves—heads of adolescent girls and young women—which in some districts still limits the successes of the school medical service. Head lice prefer girls to boys, straight hair to curly and long hair to short. In the old days plaiting the hair helped to reduce the migration of head lice, but the modern fashion of wearing the hair short has done so more successfully.

All three species of louse are strict human parasites and cannot live for long apart from their hosts. They can neither fly nor hop and cannot crawl over smooth surfaces. Given comfortable conditions they thrive amazingly, but they offer so many points of attack that all could be exterminated if we took the trouble to do it. The body has no objection to any species of louse and makes no effort to keep them away or to get rid of them, although all species may injure the body indirectly through infection. So neither in prevention nor in disinfestation have we any natural help. The chief purpose of the memorandum lately issued by the Ministry of Health [1] is to call attention to this by insisting that treatment and prevention of lousiness must be not only rigorous but thorough. Individual disinfestation is tedious but not difficult. Several methods, all satisfactory, are described in the memorandum. There are many others, but all have the same drawback—the war must be carried to complete extermination to be permanently successful. Evacuation with its disturbance of the campaign against lousiness in children, the upset of war, the reshuffling of populations, and, perhaps more important still, the severity of the winter have all been favourable for the louse to gather its forces for a new onslaught against which the Ministry of Health is calling upon us to forearm. To defeat the louse what must be done must be done at once and with thoroughness.

Points from Annual Reports

Dr. R. Veitch Clark reports 1938 as the healthiest year on record for *Manchester*. The infantile mortality-rate of 68·8, though the lowest registered in the city, is still high, but the death-rates of children over one year are satisfactory low records. The death-rate of infants under two months old (46·08 in 1938) has varied little in recent years and is still more than half what it was at the end of last century, whereas the mortality at 3–5 months has been reduced to a quarter and at 6–11 months to a fifth of what it was. Everywhere the neonatal period is the most stubborn age to surrender its mortality, but the fact that locally it varies greatly suggests that many of the deaths are preventable by powers at present in our possession. A table of the fate of encephalitis lethargica patients notified in 1919–38 is valuable because of its completeness. During the period 216 people under sixteen were notified, of whom 93 are known to be dead; 44 are alive and well; 7 are untraceable; and 72 are maimed, only 22 of these showing changes in character. Of the 528 cases over sixteen, 256 are known to be dead; 57 are alive and well; 29 are untraceable; and 186 are maimed, 9 showing changes in character. In the report of Monsall Hospital, Dr. D. Sage Sutherland, medical superintendent, remarks upon a definite fall in the death-rate from cerebrospinal fever on the abandonment of intrathecal serum. Cases treated in the first half of 1938 with serum given intrathecally and also by other routes had a fatality of 50 per cent.; those treated in the second half with serum given by other routes alone had a fatality of 8·3 per cent. The numbers are too small for the results to be significant in a disease which varies so greatly in its natural fatality, but it has been suspected for thirty years that antimeningococcal serum given intrathecally is inert. The results obtained recently with intravenous serum together with sulphapyridine by mouth are so good that this has become the standard treatment for the time being.

The report for *Aberdeen* suggests that compulsory immunisation of school-children against diphtheria is worth considering. Of school entrants during the year, 54·3 per cent. were immunised compared with 49·3 and 52·3 for the two preceding years. The figures are thought encouraging, but as the voluntary scheme depends solely on the number of consenting parents there is much to be said for compulsion. During the year the school nursing staff saw 8225 children, and of these 646 had dirty heads, 381 had faulty vision, 224 suffered from scabies or vermin, and 841 others needed medical attention. Over 300 children had poor clothing or footgear. Among 8343 children systematically examined 268 showed mild nutritional defects and 21 gross defects, while 396 had unhealthy teeth. Of 5946 pupils, 28 per cent. had imperfect eyesight and 870 already wore glasses. At the school eye clinic 5 children were found with wrong spectacles alleged to have been prescribed by opticians and one child's glasses came from a multiple store. There had been a distinct improvement in health in nursery-school infants and it is hoped that soon there will be branch schools throughout the city. Much of the report deals with physical exercises and games, and it is said that certain schools tend to concentrate on special teams when all children should have an equal share of play and coaching. Where pupils are graded according to physical ability and aptitude the scheme has proved its worth. About 10,000 pupils attend organised games and at the swimming pond of one school there were nearly 27,000 attendances during the year. On the whole, conditions for school-children are thought satisfactory.

1. Memorandum on the Louse and how to deal with it. H.M. Stationery Office. 1940. Pp. 12. 2*d*.

Influenza and Pneumonia

In the week ending Feb. 10 the notifications of primary and influenzal pneumonia in England and Wales numbered 2200, or only 30 more than the figure of the previous week. Deaths from influenza in the great towns, however, belied expectation by rising from 350 in the week ended Feb. 3 to 514 in the current week, the highest point so far reported in the present epidemic. The fall in the number of deaths between Jan. 27 and Feb. 3 was, in fact, confined to the northern towns (see table); in other areas the incidence of mortality remained stationary. The rise in the week ended Feb. 10 was, it will be seen, common to all parts of the country. From the point of view

—	Death-rates per million			
	S.E. and E.	N.	Midland	S.W. and Wales
Jan. 6	4·4	3·8	5·1	6·1
,, 13	5·5	8·1	9·1	13·9
,, 20	8·0	21·0	13·9	13·0
,, 27	15·1	25·0	20·4	19·9
Feb. 3	14·8	16·5	20·7	19·9
,, 10	21·7	23·5	30·3	30·4

of mortality the south-east and eastern regions had up to that date escaped somewhat lightly—but with the movements of population due to the war, such relative levels must be interpreted cautiously.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED FEB. 10, 1940

Notifications.—The following cases of infectious disease were notified during the week: Smallpox, 0; scarlet fever, 1076; whooping-cough, 559; diphtheria, 612; enteric fever, 11; measles (excluding rubella), 4737; pneumonia (primary or influenzal), 2200; puerperal pyrexia, 154; cerebrospinal fever, 402; poliomyelitis, 5; polio-encephalitis, 4; encephalitis lethargica, 6; dysentery, 31; ophthalmia neonatorum, 68. No case of cholera, plague or typhus fever was notified during the week.

To the 402 cases of cerebrospinal fever Cornwall contributed 9, Essex 17, Kent 16 (Margate 8), Lancaster 39 (Liverpool 7, Manchester 6, Morecambe and Heysham 6), County of London 20, Middlesex 9, Somerset 11, county of Southampton 23 (Southampton 6), Surrey 22 (Farnham 5), Warwickshire 12, Worcestershire 13 (Worcester 11), Glamorgan 35 (Cardiff 10, Rhondda 8), Monmouthshire 12 (Newport 7).

Deaths.—In 126 great towns, including London, there was no death from smallpox or enteric fever, 7 (0) from measles, 3 (0) from scarlet fever, 10 (0) from whooping-cough, 18 (0) from diphtheria, 38 (3) from diarrhœa and enteritis under 2 years, and 514 (53) from influenza. The figures in parentheses are those for London itself.

Carlisle had 4 deaths from measles. Fatal cases of diphtheria were scattered over 14 great towns, Liverpool and South Shields each reporting 3. Birmingham had 6 deaths from diarrhœa, Newcastle-on-Tyne and Nottingham each 3.

Deaths from influenza have risen this week to 514 (after a drop to 353 last week). Of the 461 outside London 120 were reported from the south-eastern area (Bournemouth and Oxford 12 each, Southampton 11, Reading 10, and Portsmouth 9); 171 from the northern area (Manchester 17, Liverpool 12, Sheffield 11, Blackburn 10, Leeds and York 9 each); 107 from the midland area (Birmingham 29, Bristol 19, Nottingham 17); 28 from the eastern area; 18 from the south-western area. In the Scottish return for the same week Glasgow reports 52 and Edinburgh 24.

LETTERS TO THE EDITOR

THE FUTURE OF CLINICAL TEACHING

SIR,—My article on the above subject has brought me a sheaf of kind and congratulatory letters from teachers and consultants in London and in the Scottish and provincial universities and from one foreign university. There have been two needlessly personal letters in your columns from friends and colleagues who should surely know me better than to misjudge my motives or to distort my criticisms. I did not expect that my suggestions would appeal to everyone, but I had hoped that men of the standing of Sir Charles Gordon-Watson and Sir Maurice Cassidy would at least produce constructive criticism, for this I would have welcomed warmly.

Sir Maurice Cassidy, while aware that the Government is at the present time paying a very large number of consultants £500 a year to "stand by" in case they are needed, doubts the ability of a better planned England, unencumbered by war, to contribute annually one-twelfth of one day's war expenditure towards securing better conditions for the teachers and the students and better treatment for the patients in our teaching hospitals. In point of fact, a mere fraction of our recent peace-time expenditure on armaments would not only give security to all the teaching schools and voluntary hospitals in the country, but would allow rebuilding and equipment on such a scale that we need no longer feel ashamed of much that we have to show when our hospitals are visited by doctors from Scandinavia and other foreign countries.

I am told that the article in dispute has achieved its main object, that of stimulating keen and interested discussion in many medical and student circles. This is to me a welcome sign that the old apathy of our profession and reluctance to contemplate changes, which may well be uncomfortable for most of us at first, are being countered by a new sense of responsibility and a new desire to help in the reconstruction which must succeed the war.

I am, Sir, yours faithfully,

Cambridge. JOHN A. RYLE.

THE BLOOD-CELLS' FAMILY TREE

SIR,—Your leading article of Feb. 10 raises some points worth further discussion. The results of Naegeli and Maximow were certainly opposed, but they approached the problem in different ways. Naegeli was a physician who studied especially the pathology of blood diseases in man. Maximow was a histologist who used experimental methods in laboratory animals, chiefly rodents, and worked less with human material; he used extensively a certain histological method (the celloidin technique) which does tend to give a one-sided view, because with it all the primitive blood-cells tend to look alike and resemble lymphocytes. I think that everyone now agrees that the actual results obtained by these men were correct; both were unquestioned masters of their subject and its techniques. The controversies have occurred about the interchangeability of their results. Naegeli's observations on human pathology have required little modification in the light of more modern work, but difficulties arose when Maximow's school suggested that their deductions from experimental work in rodents were generally applicable to the blood-cell forming system in man in health and disease.

We now realise more clearly that there are peculiarities about human hæmopoiesis. Animal experiments have, unfortunately, given remarkably little help in solving the major problems of human blood diseases; Whipple's work on iron metabolism is a notable exception. Conditions truly analogous to the human ones have rarely been discovered. In spite of much work, pernicious anæmia has not been found in animals; the nearest to it is the nutritional megalocytic anæmia of monkeys described by Wills and Stewart.[1] Just when we should like to know why the sulphanilamide group of drugs cause agranulocytosis, it cannot be induced in animals. An enormous amount of energy and finance have been expended on the transmissible leukæmias of fowls and rodents, but there is good ground for doubting with James Ewing whether these conditions are really related to the majority of cases of human leukæmia. A recent edition of a popular British textbook of blood diseases still shows a family tree for the red blood-cells which is derived from work on rabbits. It is undoubtedly true for these animals, but the effort to adapt the pathology of human cells to the rabbit's tree has given rise to distortion and to confused therapy.

These facts make me wonder whether the reason that Naegeli and Maximow could not agree was that their findings were really different and neither represented generally applicable schemes. It seems likely that though the blood-cells' family tree may be constructed

1. Wills, L. and Stewart, A. *Brit. J. exp. Path.*, 1935, **16**, 444.

on a similar plan, say, for all mammals, the actual details may differ from species to species. These differences of detail seem to be especially important in pathology.

I feel that you are rather optimistic about the application of the Sandison-Clark technique to these problems. The method was first described by Sandison [2] sixteen years ago; developments were made by Clark and co-workers [3] in 1930, and a very interesting modification using a transparent plastic material was described a year ago by Ebert, Florey and Pullinger.[4] It depends on the peculiar structure of the rabbit's ear—that Nature's gift to the physiologist. The principal feature is that it allows the new growth of tissue into a small chamber which can be directly observed at any time, the chamber remaining in position on the rabbit's ear as long as desired. It has not so far been applied to the problem of blood-cell development, except for the study of monocytes. A probable reason is that since the cells have to be observed directly they are either unstained or granules in the cytoplasm are shown by injecting the animal with intravital stains. But at the stages of blood-cell development about which there is most controversy it is the *nuclear* characteristics that are most important. To study these we have still to kill, fix and stain the tissue, thus losing most of the advantages of the Sandison-Clark method. The technique undoubtedly has a great future in the study of inflammation and the effect of all kinds of agents on inflammatory tissue; and since small fragments of other tissues, such as thyroid gland, can be successfully transplanted into the chambers, another considerable field seems to be opened. The growth of heterologous tissue has not so far proved satisfactory, so that work is likely to be limited to rabbit tissue at present.

In these problems nobody would use human tissue from choice; it is far more difficult to work with than animal, and there is no control over the supply of suitable experimental material. But until the hæmatologists find their ferret, it seems absolutely necessary to try to overcome and be patient with the difficulties. In the meantime it seems safer only to accept the application to human pathology of conclusions derived from animal experiments if there is good direct confirmatory evidence.

I am, Sir, yours faithfully,

Royal Infirmary, Manchester. M. C. G. ISRAËLS.

VERTEBRAL INJURIES IN EPILEPSY

SIR,—During the past year a number of authors have observed that in some 30 per cent. of cases treated with induced convulsions various degrees of deformity of the bodies of spinal vertebræ, sometimes amounting to full compression fracture, may be expected. In view of such findings this form of treatment has been curtailed or stopped in some hospitals. It is of interest, therefore, that in taking radiograms of the spinal column of 100 epileptics we have found similar varying degrees of deformity in the vertebral bodies in 16 cases. In 7 of these there are severe degrees of compression fracture. All these injuries have been symptomless, as might be expected from the experience of many generations of physicians with regard to epilepsy. It may be argued that the spinal deformities found in epileptics are less common than, and may have a different causation from, those following induced convulsions. This in no way diminishes the importance of the fact that vertebral injuries of similar type and severity occur in both conditions, and therefore that such injuries must have existed from time immemorial without any consequent disability having come to light.

The discovery of symptomless vertebral compressions in epileptics should lend a far less unfavourable significance to those arising after artificially produced convulsions, and should go far to dissipate the fear of Kummel's disease developing in later years.

We propose to amplify these investigations at an early date.

We are, Sir, yours faithfully,

L. C. COOK,
C. H. COMERFORD,
D. E. SANDS.

Bexley Hospital, Kent.

2. Sandison, J. C. *Anat. Rec.* 1924, **28**, 281.
3. Clark, E. R., et al. *Ibid.*, 1930, **47**, 187.
4. Ebert, R. H., Florey, H. W. and Pullinger, B. D. *J. Path. Bact.* 1939, **48**, 79.

CONGENITAL PAROTID CYSTS

SIR,—Two recent reports of congenital parotid cysts that have appeared in your issues of Jan. 27 and Feb. 17, each refer to the rarity of the condition. Surely these tumours are none other than the well-recognised adenolymphoma? Mr. Moore states that since 1895 only 26 cases have been reported; he cannot be familiar with a review of the condition by Carmichael, Davie and Stewart (*J. Path. Bact.* 1935, **40**, 601) in which they reported an additional 8 cases. Since then cases have been reported in Japan, Germany, France, South America and the United States, but curiously enough none, so far as I am aware, in England. I have seen 2 cases from Westminster Hospital within the last twelve months, and a third was seen by courtesy of Dr. T. V. Cooper of Dorchester.

In 1935 it was stated that "no case has as yet been correctly diagnosed before operation"; it appears that this will continue to be so until "surgeons have learnt of the existence of this tumour." Many more of these cases are encountered than are reported, and as long as they are shelved away under the label of "branchial cyst" they are likely to remain obscure, and progress in the diagnosis of peri-parotid swellings will necessarily suffer. The possibility of malignancy is mentioned by Mr. Moore and by C. Oden (*Amer. J. Surg.* 1935, **30**, 57); 2 and possibly 4 malignant cases are cited by Carmichael, Davie and Stewart.

I am, Sir, yours faithfully,

John Burford Carlill Laboratories, Westminster Hospital. MAGNUS HAINES.

CREATINE AND CREATININE

SIR,—Your two recent annotations on creatine and creatinine reveal a welcome interest in an aspect of metabolism whose importance in the chemistry of muscular contraction is now established. In your first annotation (*Lancet*, 1939, **2**, 1230) you state: "The central problem of creatine and creatinine metabolism is the relation of one compound to the other in the animal body. Many attempts to find the relationship have been made, but so far without any certain result." In this connexion I would like to draw attention to light thrown on this relationship by work carried out in the physiology department of the University of Capetown.

Owing to the close chemical relationship between creatine and creatinine it was taken for granted by early workers that urinary creatinine was derived from muscle creatine. Absolute proof of this obvious assumption has not yet been obtained. Folin and other workers were unable to obtain any increase in urinary creatinine following the administration of creatine, and they concluded that the two were inde-

pendent of each other in metabolism. However, Benedict and Osterberg in 1923 were able to demonstrate an increase in creatinine excretion after feeding large doses of creatine. This provided some, though not conclusive, experimental support for the belief that creatinine is derived from creatine in the course of metabolism.

In 1933 Schrire and Zwarenstein showed that injections of an acid extract of the anterior pituitary produces an increase in urinary creatinine. In 1936 Zwarenstein and I were able to show that the same extract produced an increase in muscle creatine. Braier (1931) showed that hypophysectomised dogs excreted a diminished amount of creatinine, while Zwarenstein and I (1936) found that hypophysectomy decreased the muscle creatine in toads. It is true that all these experiments were not performed on the same species of animal. Nevertheless, the fact that one type of procedure was able to increase both muscle creatine and urinary creatinine, and another procedure was able to decrease both creatine and creatinine does, I think, provide a suggestive experimental basis for the common assumption that urinary creatinine is derived from muscle creatine.

I am, Sir, yours faithfully,

London, W.C.1. B. G. SHAPIRO.

VITAMIN E AND NEUROMUSCULAR DISEASES

SIR,—In his interesting paper on the successful treatment of muscular and neuromuscular disorders with vitamin E (*Lancet*, Jan. 6, 1940, p. 10), Dr. Bicknell expressed doubts as to whether the neuro- and musculo-tropic factor of wheat germ is identical with pure vitamin E (α-tocopherol).

His doubts are based on observations of Goettsch and Ritzmann,[1] who demonstrated the efficacy of tocopherol in muscular disturbances in the young rat but were led to doubt the identity of the neuromuscular factor with tocopherol from trials with wheat-germ oil in which the natural vitamin E had been destroyed (although apparently only partially) by previous treatment with ferric chloride. After this treatment the oil still maintained the normal neuromuscular functions of young rats on a diet lacking vitamin E, but was unable to prevent abortion in adult rats who had been kept for months without vitamin E. Apparently the continuous administration of the minimal amount of vitamin E still present was capable of maintaining the muscular functions of the young animals, whereas it was insufficient to reach the level required for normal pregnancy. Various other papers substantiate the full activity of natural and synthetic tocopherol in neuromuscular disturbances. The experimental proof is steadily increasing.

In young rats born of mothers kept on a low vitamin-E diet Barrie[2] and ourselves (Demole and Pfaltz[3]) found that synthetic tocopherol and its acetate (ephynal) were capable of completely preventing the appearance of muscular or neurological disturbances. Similar observations have been made by Verzár and myself[4] in adult male and female rats suffering from vitamin-E deficiency, confirming the results described in the monograph of Einarson and Ringsted[5] with natural vitamin E. In experimental nutritional muscular dystrophy of the rabbit Mackenzie and McCollum[6] and Morris[7] found that not only prevention but also cure of the symptoms could be effected by natural and synthetic pure tocopherol.

Evans,[8] to whom the credit for the discovery of the antisterility activity of vitamin E belongs, described the neuromuscular symptoms in young rats due to its lack in 1928. He has in addition shown the efficacy of pure tocopherol in muscular dystrophy of the guineapig.[9] Lately Anderson, Elvehjem and Gonce[10] have described the successful treatment of muscular dystrophy in dogs with α-tocopherol acetate, whereas Knowlton, Hines and Brinkhous[11] have confirmed the results with this substance in rats.

The proof of the therapeutic equivalence of pure tocopherol and its acetate with natural vitamin E is of considerable practical importance since it makes possible the use of this vitamin in a stable and standardised form and the administration of the required high doses which would be difficult to supply regularly for long periods in the form of wheat germ or wheat-germ oil. Preliminary reports on trials made with tocopherol acetate (ephynal) in doses of 30 mg. and more daily in cases of progressive muscular dystrophy are encouraging (private communication).

During the trials on young rats, I was struck by the relatively late onset of the neuromuscular disturbances. The rats looked completely normal for about 3 weeks—i.e., till they reached about 2/5th of their maturity. An observer not acquainted with their previous history would therefore have been unable to ascertain the origin of the degenerative states starting after the age of 21 days or more, although histological studies would have revealed muscular changes even prior to this. Since myopathies in children also appear only after some years no-one has hitherto thought of tracing such states back to any "congenital avitaminosis," not only because of the lapse of time from birth to the onset of the disturbances but also because the pædiatrician attending the child would have to communicate with the obstetrician who was in charge of the mother during pregnancy and delivery. I suggest that efforts should be made in cases of myatrophy to ascertain the history of the child and if possible of the mother as regards miscarriages, premature births or neurological troubles during pregnancy, in the hope of finding the missing link between the antisterility and neuromuscular effects.

According to our animal experiments not only the muscles but also the sensory organs (e.g., olfactory and auditory nerves) and the intelligence may suffer,[12] and that in birds lack of vitamin E is connected with states of encephalomalacia.[13] It is therefore not impossible that in addition to tabes and poliomyelitis, suggested by Dr. Bicknell, other disturbances of the higher centres appearing in children, or as a sequel to infections or chemical intoxications in adults, might benefit from vitamin E.

I believe my remarks support Dr. Bicknell's assertion that the discovery of the importance of vitamin E in the treatment of muscular and nervous diseases "opens up new lines of thought and treatment in many diseases."

I am, Sir, yours faithfully,

Basle, Switzerland. V. DEMOLE.

1. *J. Nutrit.* 1939, **17**, 371.
2. *Nature, Lond.* 1938, **142**, 799.
3. *Schweiz. med. Wschr.* 1939, **69**, 123.
4. *Verh. Schweiz. Physiol. Berne*, 1939.
5. Effect of Chronic Vitamin-E Deficiency on the Nervous System and the Skeletal Musculature in Adult Rats, London, 1938.
6. *Science*, 1939, **89**, 370.
7. *Ibid*, 1939, **90**, 424.
8. *J. biol. Chem.* 1928, **76**, 273.
9. *Science*, 1939, **90**, 89.
10. *Proc. Soc. exp. Biol., N.Y.* 1939, **42**, 750.
11. *Proc. Soc. exp. Biol., N.Y.* 1939, **42**, 804.
12. Int. Cong. Neurol. Copenhagen, 1939.
13. Pappenheimer and Goetsch, *J. exp. Med.* 1931, **53**, 11; Dam, Glavind, Bernth and Hagens, *Nature, Lond.* 1938, **142**, 1157.

MEDICAL SERVICE WITH THE FORCES

SIR,—You announced in your news columns on Feb. 24 that the Central Medical War Committee advocates the conscription of practitioners who are within the age-limits of current proclamations. If present trends continue this will mean that all medical men under thirty-five will be affected before the end of 1940. I would suggest that it is imperative that an authoritative and impartial committee should be set up forthwith to survey the medical needs of the civilian population and the armed forces. The available medical personnel is known and an equitable quota can be allotted to meet the respective needs of the two sections. Numbers of young men are deterred from volunteering by the feeling that their services will be inadequately utilised in the forces, and that they have a full-time duty to the civilian population. Already some panel numbers are soaring to astronomical heights and it is well known that the pre-war figure of 2500 was on the boundary of satisfactory medical attention. I do not think that local war emergency committees are in a position to decide fairly the general principles involved.

I am, Sir, yours faithfully,

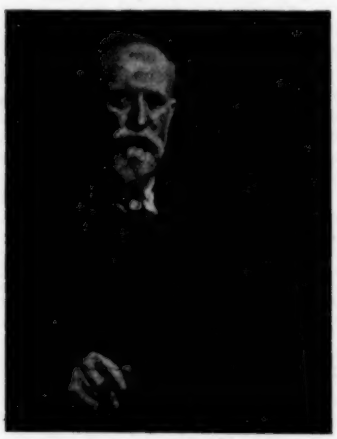
London, N.W.10. H. JOULES.

OBITUARY

WILLIAM HODGSON

KT., L.R.C.P.I., L.R.F.P.S.

Sir William Hodgson who died at Crewe on Feb. 9 in his 86th year was one of the best known figures in the public life of Cheshire. Born on a farm near Leeds in 1854 he paid an early visit to Chicago, returning when he was eight to Birkenhead, where he attended the Liverpool Institute and his mother was prominent in good works. He had to choose between the Baptist ministry — he had already drawn crowded houses as a lay preacher — and the doctor's gig. His choice falling on the latter his father insisted on a six-months' apprenticeship to a chemist, to the permanent value of which his later chairmanship of the Cheshire drug committee bore witness. Having begun medical study at St. Thomas's he went on to Glasgow, where Lister was then at work, to Edinburgh, and finally to Dublin where he was awarded an M.D. which was later questioned. After having been warned off a practice in Bucks by an assurance that a practitioner who was not Church of England would not go down with the clients there, he settled in Crewe where he was soon attending two to three hundred confinements a year and finding the advantages of small hands. From the start he entered keenly into local politics. Two years after qualification he was Liberal candidate in a municipal election and he became a councillor in 1881. His first serious encounter was with the railway companies whose officials led their employees to believe that to be Liberals would jeopardise their employment. Fearing nothing, not even authority, he was successful in scotching this intimidation. His physique was good, and until he fell and broke an arm he rode his cobs on country rounds. He was a fine tennis player, a good cricketer, and in the winter a keen pike-fisher. His mellow tenor voice was in request as a leader in oratorios.



From a painting by F. T. Copnall.

On the council one of his early acts was to found the Crewe isolation hospital in the teeth of popular opposition. The first case of small-pox taken there escaped and was rounded up by Hodgson in a cornfield. Hodgson caught the small-pox from him. His next political battle was fought on provided schools and religious education. Hodgson then had the advantage of writing the political notes for the *Crewe Chronicle*, but the night was his only free time for writing. When he became mayor in 1892 he was something of a popular hero, and it was then that the technical instruction committee was formed and began to take shape. Convinced that the education to be provided in Cheshire would gain from the experience of Europe and America, he visited Russia and U.S.A. in 1906–7. In Russia he was arrested as a spy. Later when he was chairman of the education committee all the schools were rebuilt, new secondary schools arose in every suitable area, and the school of agriculture at Holmes Chapel was linked with Manchester University.

Hodgson early became J.P. for the borough and then for the county, and was chairman for 27 years of the licensing justices. When he was voted to that post he embarked on a troubled sea, but he was both courageous and wary, and the Crewe inns became models of orderly conduct. For 30 years he was chairman of the mental hospital at Upton, and witnessed its emergence from the mediæval period of straw beds and iron rings in floors and walls to the appointment of a resident doctor under whom excursions were made into the lanes and evening dances started. Hodgson's ambition was to turn the institution from a place of care to a place of cure, and at his instigation a whole-time pathologist was engaged and a laboratory equipped. The new theatre, the nurses' home and the tubercle-free herd of cattle show his initiative. His association with national health insurance also began early. On the panel committee he represented Crewe, and in 1929 he became chairman of the new local medical and panel committees. For a time too he served on the Cheshire insurance committee. Throughout, his preoccupation was with the status and liberty of the practitioner. The B.M.A. proposals for a general medical service had a sturdy opponent. The scheme, he said, will set up a band of specialists. What is wanted is to preserve the right of the general practitioner to undertake for himself every variety of special work for which he is competent.

Late in his life honours came freely, including a knighthood in 1921, and the freedom of Crewe conferred on him in 1927 at the jubilee of the incorporation of the borough. Perhaps his highest testimonial

was given at the opening in October 1926 of the new buildings at Reaseheath, Nantwich, where the agricultural education of the county was concentrated. "The whole fabric of county public education in Cheshire," it was said, "is largely due to the energy and vision of Sir William Hodgson." On the occasion of his 80th birthday the panel committee issued a Fasciculus Cestriensis in his honour, the volume containing clinical memoranda by some 65 Cheshire doctors. In this volume the biographical note ends with the words "Mankind tends to measure us by our own standards. Sir William's standard is courage and public service. His record speaks to the first and the institutions of Cheshire to the second."

JOHN JAMES EGERTON BIGGS

O.B.E., M.R.C.S., J.P.

Dr. Biggs, who died at Cheltenham on Feb. 2 in his 73rd year, played a large part in public life at Cardiff where he was lord mayor in 1922–23. As a student at University College, Cardiff, and Guy's he was a notable athlete although he did not secure the rugger cap as his brothers Norman and Selwyn had done. He was also no mean sprinter. After some hospital experience he returned to Cardiff in 1895 and ten years later entered the city council, soon to become chairman of the education committee. Outside his general practice he was medical officer to the women's hostel at Aberdare Hall. During the late war he first served with the 2/7 Welsh regiment and later was at Gallipoli and in the Palestine campaign. He married Maud, daughter of John H. Wilson, shipowner, and leaves his widow with three sons.

R. M. F. P. writes: "When I came to Cardiff as M.O.H. in 1921 three medical men were prominently associated with local government affairs; R. J. Smith, many years a member of the council, J. Robinson, who was chairman of the public health committee, and J. J. E. Biggs, who had been chairman of the education committee and was still a member of that committee and of the health committee. The two first mentioned had passed the chair; Biggs became lord mayor a few years later. From each of them the medical officer of health received the kindliest help, advice and support and not least so from Biggs. Indeed, these men exemplified the benefits a public-health official may derive from the presence of professional colleagues on the council For, although Robinson and Biggs did not always see eye to eye, their differences of viewpoint were seldom expressed in the form of opposition to the official's proposals, and the support of two strong-minded medical men was usually regarded by the council as sufficient evidence that these proposals were sound. Outside of local politics I had many contacts with Biggs in his capacity of private practitioner, public vaccinator and medical officer to one of the women's residences in connexion with the University College of South Wales and Monmouthshire. No-one could have desired pleasanter relations than these were. The death of the last member of this medical triumvirate has reawakened the sense of loss felt when they dropped out of public life."

WILLIAM LEONARD MACCORMAC

M.B. LEEDS, F.R.C.S.E., M.R.C.O.G.

Dr. Maccormac, who died at Henley-on-Thames on Feb. 17, had spent his life in the hospital service of London. For nearly 30 years he was medical superintendent at St. James' and most of that time was responsible also for St. John's. Having qualified from Leeds in 1902 and taken the Edinburgh surgical fellowship five years later, he had held house-appointments at Bradford, Kidderminster, and Sheffield before becoming medical officer to the Leeds union. In 1905 he transferred to the Wandsworth union and after that remained in London until his retirement from ill health in July 1939. "His whole life and work," writes a colleague, "showed individuality. His energy, both physical and mental, was enormous. He was a keen clinician, an able and widely experienced surgeon, and never allowed the many administrative problems of a large and very busy hospital to divert him from clinical work. And his originality was little disturbed by the change-over from poor law to L.C.C. He managed to follow his own bent, but in so doing caused little friction. In St. James' Hospital and its neighbourhood he was held in affection for he had the gift, not too common in administrative heads, of being friendly and genial while maintaining authority. His private generosity was such that a need had only to be stated to be met if it was within his power and means. Many will grieve that his leisure has been cut short."

ELLIOTT THORNTON GLENNY

M.B. LOND.

Dr. E. T. Glenny, who died on Feb. 11, had for the last two years been in charge of the medical A.R.P. service at Bristol. His career was remarkable. Educated at Redland Hill House School, Bristol, and at St. Bartholomew's Hospital, after qualifying in 1906 he went to Peru as medical officer to the American Copper Trust. In 1911 he accompanied the Yale-Harvard expedition to the land of the Incas and the next year he was in the Putamayo with the Amazonian expedition. He returned to Europe to serve as a captain with the R.A.M.C. in France. In 1915 the first gas casualties were admitted to his station and later he published a paper describing 700 cases of gas-poisoning. He also wrote the official report on poison-gas attack for the War Office. At the end of the war he returned to Bristol where he became surgeon at Southmead Hospital, then used for orthopædic cases, and demonstrator of anatomy in the University. A period of practice in Clifton followed and in 1936 he became medical instructor under the A.R.P. department of the Home Office for the South Wales area. As a young man he had been a notable hockey player and skier; as he grew older, landscape gardening and photography claimed his leisure. A man of strong religious conviction he was chairman of the Bristol Medical Mission.

WILFRID GLEGG

M.D. EDIN., M.R.C.P.E.

Dr. Wilfrid Glegg, who died at Haslemere after a long illness on Feb. 4, was well known as a laryngologist in the Midlands before he retired through ill health in 1930. Son of a manager of the Union Bank of Scotland, he was born and brought up in Edinburgh, where he qualified in 1895. He had some experience of general practice before turning to diseases of the ear and throat and joining the staff of the Birmingham and Midland hospital. He was a skilful operator with the quiet unassuming competence which gave him success in practice. He was also aural surgeon to the Birmingham education department and was in charge of the Handsworth clinic from the time it was opened in 1913 to deal with school-children's tonsils and adenoids. He wrote little but his occasional contributions to medical journals were discerning and helpful. In 1917 he married a daughter of the Rev. E. F. G. Tyndale of Oxford, who survives him with a son of fifteen.

Dr. CYRUS GERALD AINSWORTH, who died four days after his appointment as temporary assistant medical officer of health for Bury, had been in charge of the Sussex County Hospital, 1927–38, and was also for a time deputy medical superintendent at Rainhill. He had taken both natural science and law triposes at Cambridge before qualifying from the London Hospital in 1915, when he served in the Navy. He was in his 52nd year.

Lieutenant A. N. F. CRITCHLEY, R.A.M.C., who was killed in a motor accident in France at the end of last year, was educated at St. George's Hospital. He qualified M.R.C.S. in 1934 and after a term as resident medical officer at the County Hospital, Dartford, set up in practice there. Later he was appointed to the honorary staff of the Livingstone Hospital in that town.

Captain G. H. SAUNDERS, R.A.M.C., whose name appeared in a recent casualty list, was a student at Middlesex Hospital where he gained the Lyster prize in physics. He qualified M.R.C.S. in April 1934. He chose the Army as his career and joined the R.A.M.C. He had lately been promoted captain. A contemporary at the Middlesex writes: I remember Saunders as a genial, kindly fellow. He was a keen worker, and well liked by the staff and his fellow-students.

PARLIAMENT

ON THE FLOOR OF THE HOUSE

By MEDICUS, M.P.

IN July of 1939 there was a debate on Old Age Pensions in the House of Commons and that came because of a growing demand in the country that something more should be done to improve the conditions of old people. Recently there has been the demand for pensions for spinsters at 55 and with both of these demands members of all parties have expressed sympathy. More recently still the Government undertook to re-examine the pensions situation and to ascertain whether they could make proposals to meet the admitted needs.

Old-age and Widows' Pensions

The Old Age and Widows' Pensions Bill, debated for two parliamentary days on Feb. 20 and Feb. 21, and discussed in detail this week, is the Government's answer and has provided the occasion for the display of very acute differences of opinion between the Government and the Opposition sides of the House.

This bill is the latest example of that pensions legislation which Mr. Walter Elliot, in introducing the discussion on Feb. 20 called "one of the most remarkable achievements of this century." It began in 1908 under the Asquith Government and originally benefited 500,000 people and cost between six and seven million pounds a year; it now benefits 3,000,000 people and costs about 300 million a year, the larger part of which is covered by contributions from employers and employed, but still costing the state about ten times what it did in 1908. These are large figures and the present bill adds to them, but it is not on these figures that controversy arose. The bill is divided into two parts, the first lowering the pensionable age for women to 60 both for single insured women and the wives of men who became entitled to a pension at 65. This change, Mr. Elliot calculated, would bring up the proportion of cases in which husbands and wives qualify for pension at the same time from 28 per cent. to 63 per cent.

The proposals under Part I of the bill will add, on July 1 next, 140,000 uninsured wives of existing pensioners, 20,000 insured wives and 150,000 spinsters and other insured women, making a total of 310,000, and will cause an immediate rise in the cost of the scheme to the state of about 2 million a year, rising higher in later years.

All sections of the House extended a welcome to this first part of the bill, but on the second part opinion was sharply divided. It is to this second part of the bill that the Labour Party amendment was directed and as the debate proceeded it became more and more clear that the differences were extending rather than lessening.

Part II of the bill deals with the difficult question of adding a supplementary amount to the fixed amount of 10*s*. and the means proposed is by a "supplementary pension" to be fixed from time to time (the interval was nowhere stated definitely), which can be cashed by the pensioner at the Post Office at the same time as the normal pension. The present scheme has been for supplements to be granted by the Public Assistance authorities, to whom application had to be made at frequent intervals, to justify the "need," and out of P.A.C. funds. Local authorities have strongly objected to this duty of supplementing pensions being thrown upon them; it has cost money and raised the rates, and old people have objected to the machinery of Public Assistance as being humiliating and touched with the "Poor Law" taint. The first reaction, then, of many people was to welcome the proposals, as far as they went, although a flat-rate increase of pension would have been preferred. But the method the Government have chosen for fixing the supplementary rate of pension is through the medium of the Unemployment Assistance Board, which administers unemployment assistance as apart from unemployment insurance benefit and when that is exhausted.

It is true that the Unemployment Assistance Board, universally known in every worker's home as the U.A.B., is to change its name to the Assistance Board and to absorb a new member in Dr. Mellon, warden of Toynbee Hall, lately a governor of the B.B.C. and formerly a parliamentary Labour candidate—but will it be changed in fact?

The U.A.B. has met the question of the "need" of the man who has been so long unemployed as to have exhausted his insurance benefit by assessing this need on the basis of the means of the household as a whole.

Mr. George Hall, who moved the Labour Party's amendment, declared first of all "that no organisation of workers shares the slightest responsibility for the measure now before the House." He then went on to call attention "to the feeling which exists in regard to the extension of the household means test," and said "if there is one thing which this party and the workers of the country feel bitter about it is the operation of the household means test." Mr. Hall said that just as a good industry or business sets aside 5 per cent. or 10 per cent. for depreciation of machinery, so, say, 3 per cent. should be set aside for the purpose of providing pensions of adequate amount for old workers as of right.

Mr. Hall asked how many M.P.s really understood how the regulations now worked by the U.A.B., "with its 10*s*. a week mentality," really operated. The maximum amount paid to husband and wife is 28*s*., but if a son is earning £2 10*s*. a week and living at home 17*s*. is taken off and the old people get 11*s*.

only. Not only the son's earnings but all household income is taken into account. Quoting from an answer to a question given him by the Minister of Labour, Mr. Hall showed that the following items were taken into account: unemployment insurance benefit, pensions for old age, widows, orphans and blind persons, disability and dependents' pensions, outdoor relief, and maintenance and affiliation orders given through police courts. Mr. Hall said that the employers were in advance of the Government and that 80 per cent. of the employers and of the workpeople would be prepared to coöperate with the Government in a better scheme.

Mr. Graham White, for the Liberals, took a view as definitely opposed to the Government and said, "my honourable friends and I take great exception to the administration of the care of the aged and the administration of any means test in connexion with their affairs by the Unemployment Assistance Board, a body which is only partly under the control of Parliament." He said, further, that "in this bill we are taking a major step, the only logical development of which is that the whole of the relief services will in time be concentrated in the Unemployment Assistance Board." Mr. White thought there would be "the greatest heart-burning and unhappiness caused by this unfortunate method" and gave an example of a couple of 70 applying for a pension and having, because of the nature of their household, to go through no less than five separate means tests.

Another speaker pointed out that if thrift and saving had been exercised in the home, this also was assessed and the thrifty are penalised by reduction on account of saving and the thriftless are encouraged. Mr. Messer gave another example from Middlesex, the experience of a girl earning 15*s.* a week with a blind father drawing money from the public authority under the domiciliary assistance scheme. When the girl received an increase of wages of 4*s.* a week the blind father's allowance was reduced by 4*s.* a week.

Mr. Woodburn, a new Scottish M.P., emphasised that the means test means "that nobody in the working classes" who has a pensioned or dependent relative "must ever have more than the bare minimum he needs." He gave the example of a boy with a 2*s.* 6*d.* bursary to help him at school, but because his father was on the means test, his allowance was reduced by 2*s.* 6*d.* and the boy deprived of what he needed.

The Secretary of State for Scotland, in winding up the first day's debate, sought to justify the household means test on the ground that similar tests apply with regard to treatment in municipal hospitals and in the case of milk and meals for school-children and pointed out how the removal of supplements to the old age pension from the P.A.C. would relieve the rates of various areas in Scotland. In opening the second day's debate, Mr. Jack Lawson, the miners' M.P. for Chester-le-Street and a civil commissioner for the north-eastern area, declared that "the Tories have definitely adopted the principle of the means test in its application to working-class life." "If," he said, "hon. members could see this means test, working like an acid, dissolving families, breaking them up, they would never suggest that that principle should be applied to old age pensions." When a middle-aged father "gets his notice" from the mine on account of advancing years, unless "the sons leave home he can get nothing, so they leave home." "When a boy goes away in such circumstances, the Unemployment Assistance Board calls it collusion; we call it tragedy."

More and more as the debate proceeded it became clear that the Government spokesmen and backbenchers justified the proposals for a household means test as a necessary condition of the relief of hardship and the Opposition objected to the method proposed as, in fact, a reintroduction of the Poor Law on a national scale administered by a machine outside the control of Parliament. "We shall be well on the way to becoming a regimented nation instead of a neighbourly nation," said Mr. Lawson, and ended by speaking of the "loathing of the great mass of the people at the application of this principle to them."

Miss Horsburgh, making her first full-length speech as Parliamentary Secretary to the Ministry of Health, spoke ably and with understanding of the improvement in the position of women brought about by Part I of the bill. And she created a new record in Parliament by standing up for the maiden aunt and classifying herself as one of the species. Miss Horsburgh also dealt cleverly with the fact that even if a flat-rate increase of pension were given, some hardship cases would remain and asked how these were to be dealt with, but did not attempt to meet the Labour and Liberal criticism of the household means test as such.

The last defence that the Government put up amounted to saying that in this war at the present time they could not do more and thought it, indeed, very satisfactory that Parliament could spend so much time and so much money for these purposes.

Winding up at the end, Mr. Arthur Greenwood took the view that many old age pensioners would be really worse off and substantially worse off because of the new procedure established by Part II of the bill. "We would rather have a humanely administered Poor Law system than an inhuman national monster." When Mr. Greenwood was Minister of Health he circularised boards of guardians (since that time abolished) on the administration of the existing means test and pointed out that they had the right to exercise a certain measure of discretion. But he showed how the setting up of the Unemployment Assistance Board by the Conservative Government in 1934 with the household means test had been in effect the coming back of a new mechanical Poor Law system which by this pensions legislation was penetrating further afield in the national life. It had spread to workmen's compensation. He asked whether it was the Government's intention "to pauperise the whole of our social services."

Sir John Simon, urbane and glacially reasonable, expressed surprise at some of the criticisms to which the bill had been subjected. He laid stress on the responsibilities of the Exchequer and pointed out that a general flat-rate increase would not avoid all hardship and that the suggested method of meeting it was the best available. The Chancellor also said that the fixing of supplemental payments by the Assistance Board would be for a "considerable period" and added, in reference to a remark by Mr. A. P. Herbert, "that the diuturnity of old age is a good deal longer than the diuturnity even of unemployment." Sir John ended by saying it was the Government's duty, "with the help of the House to secure that the administration [of the new pensions organisation] is good."

But the debate revealed a great gulf between those of the Opposition who object to the principle and the idea behind the household means test and those of the Government who hope to soften hard edges by good administration. It is the essential conflict between the two sides of the House, the conflict between Cavalier and Roundhead, and if we went back far enough, perhaps there was a comparable difference of opinion at the time of the landing of Hengist and Horsa. So the House divided—for the amendment, 134, and against it, 249—and adjourned accordingly at 12 minutes after 11 o'clock.

QUESTION TIME

Treasury Grant to Universities

Sir ERNEST GRAHAM-LITTLE asked the Chancellor of the Exchequer if he could now make a statement on the Treasury grant in aid of the universities and colleges in the coming financial year.—Sir JOHN SIMON replied: Yes, Parliament will be invited in the estimates shortly to be presented to maintain the provision made for the universities and colleges at the existing level—namely, £2,149,000. The Government are fully conscious of the vital part played by the universities in the life of the community, and of the importance of maintaining the standards of university education as far as possible in the strained conditions of war. Moreover, the universities are making an essential contribution to the national effort at the present time in supplying personnel of the educational standards necessary for many national services, as well as in affording more direct assistance to a number of Government departments by means of particular researches, the provision of specialised technical equipment in laboratories, and in other ways. I have satisfied myself after considering the representations of the vice-chancellors and the results of a survey of university finance carried out at my request by the University Grants Committee, that the maintenance during the coming financial year of the present provision is necessary if the universities are to continue to make their contribution to the national effort, and the Government therefore earnestly hope that local authorities will take similar action.

Neuroses in the Army

Sir FRANCIS FREMANTLE asked the Secretary of State for War what steps, other than the appointment of two consultants, had been taken for the prevention and treatment of nervous disorders, as recommended by the War Office Committee on Shell Shock, 1922.—Mr. OLIVER STANLEY replied: For the treatment of nervous disorders in the British Expeditionary Force, a psychiatric centre has been established in France, which will be expanded and supplemented as may be necessary. In the United Kingdom arrangements exist for the transfer of such cases to rehabilitation centres organised within the E.M.S. scheme of the Ministry of Health. An Army specialist in psychological medicine is being posted to each command in this country. The medical examination of recruits carried out by the civilian medical boards under the National Service (Armed Forces) Act is specially designed to prevent men who are prone to develop nervous disorders from entering the Army.

Sir F. FREMANTLE: Is it not a fact that many soldiers suffering from neurotic diseases have been brought over to this country and put into general hospitals under conditions which were definitely denounced by the committee in 1922?—Mr. STANLEY: If the hon. gentleman has any cases in mind I shall be only too glad if he will bring them to my notice.

Barrow Gurney

Mr. CULVERWELL asked the First Lord of the Admiralty what was the number of staff and patients, respectively, now accommodated at the Royal Naval Hospital, Barrow Gurney, near Bristol; and whether a dental officer was employed.—Mr. CHURCHILL replied: The daily average number of patients under treatment at the Royal Naval Auxiliary Hospital at Barrow Gurney is at present 356. The medical and nursing staff numbers 215; a dental officer is included in the staff.

Cerebrospinal Fever in the Forces

Sir ERNEST GRAHAM-LITTLE asked the Secretary of State for War how many cases of cerebrospinal meningitis had been reported in the fighting forces of the Crown, either at home or abroad, since the outbreak of war; and what measures, in view of the high infectivity and serious character of this disorder, had been taken as regarded isolation and institutional treatment.—Mr. OLIVER STANLEY replied: The number of cases is 371. They have been sporadic. All have been isolated and treated in fever hospitals by modern methods, and precautions to prevent the spread of infection have also been taken in respect of immediate contacts. Close liaison is being maintained with the Ministry of Health and the Medical Research Council.

Emergency Medical Service

Sir ERNEST GRAHAM-LITTLE asked the Minister of Health in what respect the Central Medical War Committee differed from the Central Emergency Committee of the British Medical Association as regarded its composition, functions, and responsibility for advising him; whether any change had been effected other than of name; and whether the Central Medical War Committee was in any way, as was the earlier committee, under the control of the British Medical Association.—Mr. ELLIOT replied: The Central Medical War Committee differs from the Central Emergency Committee of the British Medical Association in composition, functions and responsibilities. It includes representatives of the Medical Research Council and of special branches of medicine, two of whom were appointed by the Government. It was constituted after the outbreak of war to advise the Government on the allocation of doctors to H.M. Forces and to civilian services connected with the war, and generally to represent the profession in any negotiations with the Government affecting questions of medical personnel. It is not in any way under the control of the British Medical Association.

Payment for Air-raid Casualties

Mr. GROVES asked the Minister whether the proposed remuneration of 16*s.* per annum for the treatment of air-raid casualties, not being insured persons, meant that, if a practitioner treats a casualty once only, he will receive payment for one day only or approximately one halfpenny, or whether there was to be a central fund representing all non-insured persons, by reason of the responsibility of the medical profession for all members of the community whether insured persons or not.—Mr. ELLIOT replied: The fee of 16*s.* payable under the scheme covers a period of one year from the first visit, whatever the number of visits paid in the year. There is no such central fund as is suggested in the latter part of the question.

Special Diet for Invalids

Dr. SUMMERSKILL asked the Minister of Food whether he would give instructions to food control committees to give an extra ration of butter to patients certified by a doctor to be suffering from a serious illness where it was essential that the diet should be palatable.—Mr. W. S. MORRISON replied: I am advised that the committee of the Medical Research Council, which was specially appointed to consider the needs of invalids and persons upon a special diet in relation to the rationing of certain foodstuffs, were unanimously of the opinion that there is no evidence to show that certain individuals are unable satisfactorily to digest margarine replacing butter in their diets. In view of this authoritative pronouncement I cannot accept the suggestion.

Cost of Sickness Benefit

Mr. RHYS DAVIES asked the Minister of Health whether there had been an increase in the amounts recently issued to approved societies to cover the cost of sickness and disablement benefit; if so, what was the estimated increase over and above any other similar period in any previous year; and if he could state the reason for this.—Mr. ELLIOT replied: Yes, I am informed that an increase in the amounts issued to approved societies during the present year, as compared with last year, has been necessitated by increased claims for sickness benefit, on account of the higher incidence of influenza. The figures for this year are not abnormal in comparison with those for the epidemic years of 1933 and 1937, as the hon. member will see from the following statement of the issues for the early part of each of the past eight years. The amounts issued to approved societies during the period Jan. 1 to Feb. 20 inclusive in each of the years 1933–40 are as follows:—

	£		£
1933	3,565,000	1937	3,463,000
1934	2,867,000	1938	2,563,000
1935	2,720,000	1939	3,111,000
1936	2,308,000	1940	3,486,000

Danger of Metal-grinding Industry

Mr. MARSHALL asked the Home Secretary if he was aware of the high rate of mortality among workers in the metal-grinding industry arising from silicosis and other respiratory diseases, and of the difficulty of establishing claims for compensation under the silicosis scheme; and, in view of this, would he now consider amending the scheme in order to provide for the inclusion of other respiratory diseases which were certified by medical men to arise from the metal-grinding industry.—Sir JOHN ANDERSON replied: I understand that in 1938 the mortality-rate of Sheffield grinders from respiratory tuberculosis, though it had greatly declined in recent years, was still higher than that of the general population of the city; but under the existing law there is no power to extend the silicosis compensation scheme, which covers silicosis accompanied by tuberculosis, to men not employed in the silica processes since 1927, or to other respiratory diseases. The question of legislation to make additional provision for workmen suffering from illness which is due to their employment but is not a specific industrial disease is a very difficult one, to which the attention of the Royal Commission on Workmen's Compensation has been drawn.

Mr. MARSHALL: Is the Minister aware that the mortality among Sheffield grinders is estimated to be four times the general average of the country, and in view of that appalling mortality, is he not prepared to do something to bring about an improvement?—Sir J. ANDERSON: The hon. member will understand that I am concerned with diseases due to employment The problem of determining whether an illness which is not specific to a particular employment has, in fact, been caused by that employment or has arisen otherwise, is a very difficult practical question.

Powers of the Welsh Board

Sir HENRY MORRIS-JONES asked the Minister of Health what additional powers were now being conferred on the Welsh Board of Health over and above those which the board now held.—Mr. ELLIOT replied: The additional powers which it is proposed to exercise through the Welsh board are those relating to (*a*) Housing, and town and country planning; (*b*) General local sanitary services, e.g. water-supply, sewerage and sewage disposal, public cleansing, &c., as well as certain other local government services; (*c*) Alterations of boundaries of local-government areas.

"Hardening the Troops"

Sir JOSEPH LEECH asked the Prime Minister whether he would move to appoint a committee of the House to investigate complaints of carelessness and inefficiency on the part of the Army Medical Service officials with allegations of neglect of the sick and the avoidable spreading of pneumonia arising from a policy of hardening the troops.—Mr. CHAMBERLAIN: While it is true that the sudden increase in the size of the Forces, their wide distribution, and necessary movements have caused difficulties in regard to medical arrangements, and these difficulties have been accentuated by the recent influenza epidemic, the departments concerned are doing their utmost to remedy any deficiencies. All complaints and criticisms which have been received have been promptly and carefully investigated, though many have been found to be inaccurate and exaggerated. I do not think, therefore, that investigation by a committee of this House, or any special report, is required, and I would add that the suggestion that the health of the troops has been allowed to suffer through a policy of hardening them cannot be too strongly repudiated.

Social Services in the West Indies

Mr. MALCOLM MACDONALD, Secretary of State for the Colonies, announced that the Government had accepted in principle the main recommendations made by the West Indies Royal Commission for the creation of a special organisation under a comptroller to develop the social services there and for the provision of some £1,000,000 a year by the United Kingdom Exchequer for this purpose. (The full report is not to be published at present). He added that in future greatly increased provision would be made for development and welfare throughout the Colonial Empire. The Government proposed to introduce legislation providing for assistance from United Kingdom funds up to £5,000,000 a year for colonial development and welfare, and in addition up to £500,000 a year to assist in the various fields of colonial research.

Medical News

University of Cambridge

Dr. A. E. Barclay and Dr. Philippe Bauwens have been appointed substitute examiners for the diploma in medical radiology and electrology during 1940.

On Feb. 24 the following degrees were conferred:—

M.D.—G. L. Foss,* D. A. S. Blair, A. S. Bookless, G. I. Watson, K. C. Bailey and F. A. H. Simmonds.

M.B., B.Chir.—John Evans,* J. E. M. Melville,* C. M. Fletcher, R. E. Bonham-Carter, G. C. Barron, M. M. Bull, and B. E. Camus.

* By proxy.

Naval Honours

The D.S.C. has been awarded to Surgeon Lieutenant C. G. Hunter, principal medical officer of H.M.S. *Achilles*, and to Surgeon Lieutenant R. W. G. Lancashire, H.M.S. *Exeter*. Surgeon Lieut.-Commander A. J. Burden, H.M.S. *Ajax*, and Surgeon Commander John Cussen, H.M.S. *Exeter* were mentioned in dispatches.

Medical Research Council of Ireland

The council of Ireland has made research grants to the following:—Dr. S. J. Boland (an investigation of pelvic architecture at the National Maternity Hospital, Dublin); Dr. T. E. T. Bradshaw (study of sex hormones at the Rotunda Hospital, Dublin); Miss E. M. Mason, D.Sc. (work on goitre research in Co. Tipperary). A grant-in-aid has been awarded to Dr. Cecil Mushatt. The grants made last year to Prof. T. W. T. Dillon, Dr. R. A. Q. O'Meara, Prof. Hans Sachs, and Miss E. J. Power Steele have been renewed.

Hospital Saving Association

This association has supplemented the £563,484 already paid to the voluntary hospitals for last year's working by a final distribution of £106,600.

War-time Welfare Centres in Kensington

There are normally eight welfare centres in Kensington, but five were closed after the evacuation of mothers and children from London, and at the beginning of the year four were still shut. Two of these were reopened in January within the premises of first-aid posts near the original centres. They provide constructive work for A.R.P. volunteers who help the health visitors. Precautions were taken to ensure that there should be no interference with the primary duty of the post, and none of the rooms in which first-aid would be given were used for the centre. Should a raid occur during a session, the mothers and children would leave the post for an adjacent shelter.

Dr. James Fenton, medical officer of health for Kensington, with this combination of A.R.P. and maternity and child welfare solves a double problem, for there is a lack of staff to deal with the normal peace-time work among the returned evacuees, and a large number of A.R.P. personnel kept in forced inaction owing to the absence of air-raids. The temporary accommodation of welfare centres at first-aid posts has also the advantage of economy in heating, lighting and rent.

Appointments

AINSWORTH, C. G., M.B.Camb., temporary assistant medical officer of health for Bury.

CHOLMELEY, J. A., M.B.Lond., F.R.C.S., resident surgical officer and medical superintendent of the country branch of the Royal National Orthopædic Hospital at Stanmore.

CULLEN, C. H., M.B. Belf., F.R.C.S.I., resident assistant medical officer at Crumpsall Hospital, Manchester.

DOUGLAS, D. M., M.B. St. And., M.S. Minnesota, F.R.C.S., first assistant in the surgical unit, British Postgraduate Medical School, London.

HENDERSON, EDWIN, M.B. Belf., F.R.C.S.E., resident surgical officer at the Booth Hospital for Children, Manchester.

JENNINGS, P. A., M.B. N.U.I., D.P.H., deputy medical superintendent at Baguley Sanatorium, Manchester.
LEADER, R. A., M.R.C.S., D.P.H., medical officer of health and school medical officer for Erith.
LESSER, S. A. H., M.B., junior assistant medical officer for Wakefield.
MAYER, A. L. R., M.B. Glasg., junior assistant medical officer at High Carley Sanatorium, Nr. Ulverston.
MEIR, M., M.B.Birm., resident surgical officer at Ashton-under-Lyne.
STUBBINS, H. R., M.D.Edin., D.P.H., medical officer of health for Neath.
Royal Free Hospital—The following appointments are announced:—
HILL, GLADYS M., D.M.Oxfd, F.R.C.S., M.R.C.O.G., hon. obstetrical surgeon;
MOORE, JOCELYN, M.B.Lond., F.R.C.S., M.R.C.O.G., hon. assistant obstetrical surgeon;
DOLLAR, JEAN M., M.S.Lond., F.R.C.S., D.O.M.S., hon. assistant surgeon in the ophthalmic department;
GRAY, CHARLES, M.B.Manc., F.R.C.S., hon. assistant in the orthopædic department; and
JONES, OLWEN, M.B.Lond., assistant medical registrar.
London County Council.—The following promotions are announced:—
STOKES, A. B., B.M.Oxfd, M.R.C.P., D.C.H., D.P.M., temporary deputy medical superintendent at Mill Hill Emergency Hospital;
KENNEDY, A., M.D.Lond., M.R.C.P., D.P.M., temporary deputy medical superintendent at Sutton Emergency Hospital;
SLATER, E. T. O., M.B.Camb., M.R.C.P., D.P.M., temporary clinical director at Sutton Emergency Hospital;
WALSH, A. M., L.R.C.P., D.P.M., temporary specialist at Mill Hill Emergency Hospital;
FRASER, T. R. C., M.B.N.Z., M.R.C.P., D.P.M., temporary specialist at Mill Hill Emergency Hospital; and
SARGANT, W. W., M.B.Camb., M.R.C.P., D.P.M., temporary specialist at Sutton Emergency Hospital.

Examining surgeons under the Factories Act, 1937: Dr. T. G. REAR (Harrogate district, Yorkshire); Dr. P. THORNTON (Erdington and Birmingham district, Warwickshire); and Dr. G. S. LEVIS (Lincoln district).

Medical referee under the Workmen's Compensation Act, 1925: Dr. JOSEPH MCCULLOCH (Dumbarton Sheriff-court district, Sheriffdom of Stirling, Dumbarton and Clackmannan).

Medical Diary

Week beginning MARCH 4

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1.
THURSDAY—2.30 P.M., Dr. J. C. Spence: On the Nature of Disease in Infancy. (Bradshaw lecture.)

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1.
TUESDAY—5 P.M., general meeting of fellows.
Orthopædics: 2.30 P.M., clinical meeting at the Royal National Orthopædic Hospital, 234, Great Portland Street, W.1.

WEDNESDAY
History of Medicine: 2.30 P.M., Major Saville Peck and Dr. A. W. Langford: Three 18th Century drug chests—their Cambridge owners, Francis Vigari, John Addenbrooke, William Heberden.
Proctology: 4.30 P.M., Mr. J. P. Lockhart-Mummery: War Wounds of the Large Intestine (Presidential address). Sir Charles Gordon-Watson and Surgeon Rear Admiral G. Gordon-Taylor will also speak.

THURSDAY
Clinical: 2.15 P.M., Mr. D. N. Matthews: 1. Scleroderma Treated with Pedicle Graft. Dr. E. Davis: 2. Orthostatic Purpura following Trauma. 3. Chronic Purpura following Rheumatic Fever.

BRITISH POSTGRADUATE MEDICAL SCHOOL, Ducane Road, W.12.
WEDNESDAY—11.30 A.M., clinico-pathological conference (medical).
2 P.M., Mr. E. J. King, Ph.D.: Hepatic Function and Jaundice.
2.30 P.M., Dr. C. M. Hinds Howell: Ward Clinic.
3 P.M., clinico-pathological conference (surgical).
THURSDAY—2 P.M., Dr. Duncan White: radiological conference.
FRIDAY—2 P.M., clinico-pathological conference (gynæcological).
Daily 10 A.M.—4 P.M., medical clinics, surgical clinics and operations, obstetrical and gynæcological clinics and operations. 1.30 P.M.-2 P.M., post-mortem demonstration.

TAVISTOCK CLINIC, Westfield College, Kidderpore Avenue, N.W.3.
MONDAY—3 P.M., Dr. H. Crichton-Miller: Self and the Family. 4.15 P.M., Dr. Crichton-Miller: Self and the Community.

FELLOWSHIP OF MEDICINE AND POSTGRADUATE MEDICAL ASSOCIATION, 1, Wimpole Street, W.1.
MONDAY to SATURDAY—Brompton Hospital, S.W.3.
MON. and THURS., 5 P.M., M.R.C.P. course in chest diseases.
Royal Cancer Hospital, Fulham Road, S.W.3. Morning, F.R.C.S. (final) comprehensive course. Royal National Orthopædic Hospital, Stanmore, Middlesex. SAT., 2 P.M., F.R.C.S. (final) orthopædic course.

BIOCHEMICAL SOCIETY.
FRIDAY—2.45 P.M. (St. Thomas's Hospital medical school, S.E.1), short communications.

Vacancies

Bedford County Hosp.—H.S., at rate of £155. Also cas. O., at rate of £150.
Birmingham Maternity Hosp.—Res. M.O. and registrar, at rate of £200.
Bournemouth County Borough, P.A.I., Christchurch.—Res. M.O., £300.
Bradford City Education Committee.—Part-time psychiatrist for Child Guidance Clinic, £2 12*s.* 6*d.* per session.
Bristol Eye Hosp.—Jun. H.S., at rate of £100.
*British Postgraduate Medical School, Ducane Road, W.*12.—Three H.S.'s to surgical unit, each at rate of £105. Also H.P. in dept. of medicine, at rate of £105.
Cambridge, Department of Physiology.—George Henry Lewis studentship, £250.
Cambridge, Addenbrooke's Hosp.—Res. anæsthetist and emergency officer, at rate of £130.
Cardiff, King Edward VII Welsh National Memorial Assn.—Asst. res. M.O. for Sully Hosp., £200.
*Central London Throat, Nose and Ear Hosp., Gray's Inn Road, W.C.*1.—Hon. assts. in out-patient dept.
Chester Royal Infirmary.—H.S., also H.S. to ear, nose, and throat and gyn. depts., each £150.
Cumberland County Council.—Temp. consultant in obstetrics, at rate of £500.
Derbyshire Education Committee.—Temp. asst. school M.O., at rate of £500.
Derbyshire Royal Infirmary.—H.S. for casualty dept., £150.
Doncaster Royal Infirmary.—H.S. to ear, nose and throat and ophth. depts., and res. anæsthetist, at rate of £150.
*East Ham Memorial Hosp., Shrewsbury Road, E.*7.—Part-time pathologist.
Grimsby and District Hosp.—Res. orthopædic officer, at rate of £275.
Guildford, Royal Surrey County Hosp.—H.S., at rate of £150.
Harrogate, Royal Bath Hosp.—Res. M.O., at rate of £200.
Hertfordshire County Council.—County M.O.H., £1500. Also sen. asst. school M.O., £750.
Hereford, Herefordshire General Hosp.—H.S. for casualty and ear, nose and throat dept. Also H.P. Each £100.
*King Edward Memorial Hosp., Ealing, W.*13.—Cas. O. and deputy res. M.O., at rate of £225.
Larbert, Royal Scottish National Institution.—Asst. M.O., £350.
Leicester Royal Infirmary.—Anæsthetist and H.P., at rate of £150 and £125 respectively. Also jun. cas. O., at rate of £100.
Liverpool Sanatorium, Delamere Forest, near Frodsham.—Assistant to medical supt., £225.
*London Chest Hospital, Victoria Park, E.*2.—H.P., at rate of £200.
London County Council.—Temp. asst. M.O.'s (Class I), each £350. Also temp. asst. M.O. (Class II), £250.
Maidstone, Kent County Ophthalmic and Aural Hosp.—Ophth. H.S., at rate of £200.
Manchester Royal Infirmary.—Res. M.O., £200.
Manchester, Ancoats Hosp.—H.S., at rate of £100.
*Maternity Hosp. for the Wives of Officers, 60 Portland Place, W.*1.—Jun. obstet. officer, £100.
Middlesex County Council.—Res. cas. M.O. for Central Middlesex County Hosp., £350.
*National Temperance Hosp., Hampstead Road, N.W.*1.—Cas. O., at rate of £140. Also H.P. and H.S., each at rate of £130.
Newark General Hosp.—Res. H.S., at rate of £175.
Newcastle-upon-Tyne, Royal Victoria Infirmary.—Res. M.O., £250.
Nuneaton Borough.—Temp. school M.O. and asst. M.O.H., £500.
Oxford, Radcliffe Infirmary.—Obstet. H.S., at rate of £100.
Oxford, Wingfield-Morris Orthopædic Hosp.—Res. H.S., at rate of £100–£120.
Oxford University.—Graduate assistant in Dept. of Pathology, £251–£300.
Oswestry, Robert Jones and Agnes Hunt Orthopædic Hosp.—H.S., at rate of £200.
Preston Royal Infirmary.—H.P., £150.
*Queen's Hospital for Children, Hackney Road, E.*2.—H.P. and cas. O., each at rate of £100.
Royal College of Surgeons of England.—Examinerships.
*Royal Cancer Hosp., Fulham Road, S.W.*3.—Radiologist, £500.
Ryde, I.W., Royal Isle of Wight County Hosp.—H.P., £130.
Salop County Council.—Jun. res. M.O. at County Council Hosp., £150.
*Salvation Army, Mothers Hospital, Clapton, E.*2.—Sen. R.M.O., £150.
*South London Hosp., Clapham Common, S.W.*4.—H.S., at rate of £100.
South Shields, Ingham Infirmary.—H.S., £150.
Staffordshire County Council.—Res. asst. M.O. for Wordsley Public Assistance Institution, at rate of £300.
Stafford, Staffordshire General Infirmary.—H.P., £150.
Sunderland, The Sir John Priestman, Durham County and Sunderland Eye Infirmary.—Two res. H.S.'s, each £175.
Swanley, Hosp. Convalescent Home, Parkwood.—Res. M.O., at rate of £200.
Truro, Royal Cornwall Infirmary.—Sen. H.S., £150. Also H.P. and H.S., each £120.
Ventnor, Isle of Wight, Royal National Hosp. for Consumption.—Two asst. res. M.O.'s, each at rate of £250.
Walsall General Hosp.—Cas. H.S., £150.
Warrington Infirmary and Dispensary.—Third resident, at rate of £150.
West Bromwich, County Borough, Hallam Hospital.—Res. obstet. officer, £300.
West Riding of Yorkshire Hosps. Board.—Res. houseman for Pinderfields Casualty Unit, at rate of £200.
Wolverhampton Royal Hosp.—Cas. O., at rate of £100.
*Woolwich Memorial Hosp., Shooters Hill, S.E.*18.—Jun. res. M.O., at rate of £133 6*s.* 8*d.*
The Chief Inspector of Factories announces vacancies at Alford, Aberdeen; and Leuchars, Fife.

NOTES, COMMENTS AND ABSTRACTS

"MENTAL HEALTH"

THE war has hastened rather than postponed the fusion of the voluntary mental-health services of this country which was one of the most important reforms suggested by the Feversham committee in its report last July. Over a year ago the Central Association for Mental Welfare, the Child Guidance Council, and the National Council for Mental Hygiene had set up a mental-health emergency committee on which representatives of the Association of Mental Health Workers and Psychiatric Social Workers also sat. Now as an earnest of even closer coöperation in the future these three bodies have joined to produce a common journal entitled *Mental Health* which will take the place of their separate publications. The first number reflects some of the problems which have occupied the emergency committee since the outbreak of war. Dr. Emanuel Miller discusses the bedwetting problem which has proved almost as puzzling as the mind of Hitler. Miss Edna Henshaw describes how the trained worker has been able to help in the psychological difficulties of evacuation. A register of trained mental-health workers was compiled by the emergency committee and workers were lent to local authorities who were in difficulties with their evacuees. Some of these loans have already been changed into permanent appointments, a tacit recognition of the value of the work. The holiday homes of the Central Association for Mental Welfare have also been adapted for the use of evacuated defectives. Till now children have been its main preoccupation, but the emergency committee is once more turning its attention to mental-health work among adults and to its educational activities. The Central Association for Mental Welfare hopes to hold a course for medical officers in London in April and a child-guidance training centre has been established in Cambridge by Miss L. G. Fildes, Ph.D. The Mental Health Emergency Committee may be addressed at 24, Buckingham Palace Road, London, S.W.1.

INTERPRETATION OF TESTS FOR DRUNKENNESS

THE committee on tests for intoxication of the Chicago National Safety Council is in accord with the interpretation of chemical tests for alcoholic intoxication recommended by the committee to study problems of motor-vehicle accidents of the American Medical Association. This ruling lays down that (1) a person with a concentration of less than 0·05 per cent. by weight in the blood or its equivalent in urine, saliva or breath should not be prosecuted for driving while under the influence of alcoholic liquor; (2) a person with a concentration above 0·15 per cent. should be considered as under such influence; and (3) a person with a concentration between 0·05 and 0·15 per cent. should be prosecuted only when the circumstances and results of physical examination give definite confirmation that he is under the influence of alcohol.

FALSE NOSE

THE work of the prosthetist is at times a necessary alternative, and at others an essential accessory, to plastic surgery, either as a temporary or permanent measure. It is of greatest value when severe damage to the nose or ear or extensive loss of periorbital bone makes surgical reconstruction well-nigh impossible. Bubulian [1] has described in detail the technique by which an artificial nose or ear is made. A plaster-of-paris impression of the damaged area is first taken. This is the negative. From this a positive is prepared, which is an exact replica of the patient's condition. Upon this the new part is shaped with pink dental wax, and the pattern is tried on the patient, all edges being smoothed out so as to pass imperceptibly into the surrounding tissues. With the pattern replaced on the positive cast, further plaster-of-paris is superimposed to obtain a corrected negative. The wax is now removed by softening (not melting) with heat, so that between the two casts is a space which represents exactly the desired shape. A ¼-in. channel is drilled from this to the exterior, through which liquid latex rubber is poured. Vulcanisation completes the procedure. The moulds are retained as a permanent record from which duplicates can be made. The prosthesis is kept in place with mastisol, or by attachment to a spectacle frame. If care is taken to get a dull finish, resembling skin, perfect disguise can be achieved.

1. Bubulian, A. H., *Proc. Mayo Clin.* 1939, **14**, 433.

PORTABLE LIGHTING SET

THE accompanying illustration depicts a portable lighting set, of which six have been made for use in the casualty department and wards of the Birkenhead General Hospital, designed for emergency service when the main supply has been put out of action. The 30 watt lamp is adjustable to a height of about 9 ft., and the light can be turned in any direction. The power is supplied by a 12 volt, 57 amp. hr. battery. The price is 7½ guineas, and the outfit is manufactured by Messrs. Garlick, Burrell and Edwards, Ltd., of Birkenhead.

STERILISATION OF SWIMMING-BATHS

IN the ideal swimming-pool clean water perpetually flows through the bath and is not returned to it. The next best type is a pool in which the water constantly flows through and is both filtered and sterilised before being returned to the bath. In the most modern method of filtration the addition of chemicals to the water as it leaves the pool forms a precipitate which carries with it those minute substances that have made the water "muddy." The water next passes through a sand filter which traps the precipitate. The water is now ready for sterilisation. The commonest way of doing this is chlorination, which has the disadvantage that a careful calculation has to be made to ensure the correct strength of free chlorine in the water, the range of percentages within which safety lies being narrow. Above a strength of 0·5 in 1,000,000 chlorine irritates the eyes and mucous membranes of the bathers, whereas below 0·2 in 1,000,000 it allows many bacteria to flourish.[1] Ultraviolet rays can also be used to sterilise water, but the flow of water has to be controlled so that all of it remains within a foot of the source of the rays for at least 4 sec. Perhaps the most satisfactory form of sterilisation of water is the catadyn process. This was first introduced as the catadyn contact process, which consisted in allowing the water to flow over silver-plated sand. By this method a minute amount of silver enters into solution in the water and imparts to it a remarkable sterilising power, which will last for a considerable time, provided that the water has been previously filtered. The super-luxurious lido can even substitute gold for silver, gold being equally

1. *Lancet*, 1934, **1**, 1363.

bactericidal and having a greater pulling power. The catadyn contact process, however, has several drawbacks: prolonged contact of the water with the silver is necessary; the correct dosage is difficult to arrange; and the system is awkward to control. For these reasons it has been superseded by the electro-catadyn process, in which the water to be cleaned is charged with a precise dose of silver ions by the passage of an electric current from silver electrodes.[2] The electro-catadyn process installed at a swimming-pool at Fiuggi is described by Alessandrini and Labranca,[3] who say that there it has proved entirely satisfactory. They quote good results reported from Wallasey in a bath in which a mixture of sea water and fresh water is used, but they point out that the electro-catadyn system at Freiburg-im-Breisgau has been criticised by E. Remy[4] who found that more bacteria came out of the bath than entered it with the water when there was a great rush of bathers.

SMALLPOX IN THE SECOND CENTURY

Captain ARTHUR MAUDE writes: One of the severest epidemics spread by the movement of large bodies of troops began in A.D. 166 and has escaped the notice of modern historians[5]; Gibbon does not mention it, but five ancient writers noted it—Julius Capitolinus, Eutropius, Ammianus Marcellinus, Orosius, and Galen. In the year 166 a Roman army of 5 legions under Avidius Cassius, which had been engaged for five years in Syria and Babylonia, captured the Parthian city of Seleucia, on the Tigris, close to Ctesiphon. While sacking the city a soldier opened a gold coffer in the temple of Apollo, according to Capitolinus; according to Marcellinus he opened a narrow hole leading to a deep gulf; in either case there was a focus of infection which spread through the army. The Army returned to Europe under Verus, co-emperor with Marcus Aurelius, and settled at a base near Aquileia on the Adriatic. They carried the infection with them and many, including Verus himself, died. For some reason the son of Marcus Aurelius, the future Emperor Commodus, aged five, was sent up from Rome to army headquarters, and Galen was ordered to attend him, when he sickened; the child unfortunately recovered. Galen has left the only, meagre, description of the symptoms. "Pustules appear on the body, accompanied by inward heat and putrid breath, with hoarseness and cough. If the impostumes broke there was a chance of the patient's life, if not he was certain to die. Diarrhœa set in and was the surest token of death." Terse as it is this description can only be that of smallpox. The epidemic spread over the whole of Italy as far as the Rhine and into Gaul, attacking all ranks of society, with a very high mortality. Eutropius says that more than half the population died and almost all the troops, while the war against the Marcomanni in Germany was prolonged for three years from the difficulty in finding recruits. The accounts of wholesale funerals in carts and wagons recall those of Defoe.

THE MAICO AUDIOMETER

THE use of the audiometer is increasing, for it makes it possible to estimate hearing loss accurately over a wide range of frequencies. If the results of such tests are to be comparable the instruments with which they are made must be standardised. This was recognised by American otologists, and a year ago specifications for audiometers were laid down by a committee appointed by the American Medical Association. Stress was laid on the maintenance of accuracy of each tone, the provision of a comprehensive range of frequencies, and purity of the note in the receiver with the minimum of extraneous (instrument) noise. In addition it was decided that the decibel notation should be used and that attenuation of the intensity of the tone at each frequency should be by steps of 5 decibels or less. A standard of calibration was also defined. The committee insisted that the marketing and advertising of these instruments should accord with the rules previously made to govern the sale of physical therapy apparatus. The best known audiometers have been those of the Western Electric Company, but the Medical Acoustic Instrument Company of Minneapolis, Minnesota, U.S.A., have produced a good instrument, the Maico D-5, sold in this country by Amplivox Ltd., of 2, Bentinck Street, London, W.1. It costs 70 guineas, although this price is likely to rise, and complies with the specifications of the A.M.A. committee. The working parts are contained in an attractive wooden cabinet no larger than a medium-sized attaché case. The instrument panel is inclined for ease of manipulation whether the operator is sitting or standing, and the frequency and intensity dials are illuminated. Models are provided for both A.C. and D.C. mains. There are various ways in which the makers claim that the operating technique is simplified without any loss of efficiency or life of the instrument. A booklet on various aspects of audiometry is supplied with each.

2. *Lancet*, 1934, **2**, 176.
3. Alessandrini, A., and Labranca, G., *Ann. Igiene, Roma*, April, 1939, p. 14.
4. Remy, E., *Z. Hyg.* 1937, **119**, 263.
5. I find a good account of it in Philip Smith's Ancient History, 1865, vol. iii, p. 518.

BIRD'S EYE VIEW

THOUGH "Science Front 1939" is a rather misleading title—only a few sectors of the front are visited—this "popular" book by Mr. F. Sherwood Taylor, Ph.D. (Cassell and Co., 1939, pp. 301, 7*s*. 6*d*.) is readable and reasonably up to date. The first chapter, after showing us Erasmus Darwin accusing flowers of adultery, and his grandson Charles playing a trumpet to delight a runner bean, deals with auxins, or growth-producing substances in plants, and wanders off into raising cuttings; what might be called plant faking; and hydroponics. The second and third chapters, about chemotherapy and sex hormones, should contain nothing new to our readers, unless possibly the apparent neologism "neutered" for castrated. Other chapters are given up to proteins, viruses, and organisers; cancer; shock therapy for schizophrenia (a mere "bibful" of remarks); production of oil from coal; mechanism of television; atomic structure, with a description of the cyclotron; the quartz clock; aurora borealis and sunspots; general astronomy; and, perhaps most interesting of all, the amazing properties of helium II.

Births, Marriages and Deaths

BIRTHS

PLUMMER.—On Feb. 25, at Cheam, the wife of Dr. N. S. Plummer—a daughter.

WALTERS.—On Feb. 20, in Poona, the wife of Captain J. H. Walters, I.M.S.—a daughter.

MARRIAGES

BURDEN—MALFROY.—On Feb. 20, at Plymouth, Alexander James Burden, Surgeon Lieut.-Commander R.N., to Margaret Malfroy, of Wellington, New Zealand.

MATHER—BULLOUGH.—On Feb. 24, at Hindley, Northage John de Ville Mather, M.B., of Todmorden, to Frances Mabel Bullough, M.B., of Hindley.

PARNELL—PARNELL.—On Feb. 21, at West Haddon, Richard William Parnell, B.M., to Dorothy Jane Parnell, of Barberton, South Africa.

SHIELDS—MEAN.—On Feb. 24, in London, Noel Peter Shields, M.R.C.S., Flying Officer, R.A.F., of Newcastle-under-Lyme, to Verna Mean, of Cambridge.

DEATHS

AINSWORTH.—On Feb. 20, at Bury, Lancs, Cyrus Gerald Ainsworth, M.B.Camb.

HARDING.—On Feb. 21, at Stroud, Edward Palmer Harding, L.R.C.P.I., aged 57.

KIRK.—On Feb. 26, in Leeds, John Lamplugh Kirk, M.B.Camb., late medical officer of health for Pickering.

SHORT.—On Feb. 24, James Joseph Short, M.R.C.S., of Clapham Common, aged 81.

THOMPSON.—On Feb. 18, Elsie Marsh Thompson, M.D.Manc., J.P., of Paignton.

VOISEY.—On Feb. 26, in Kensington, Clement Bernard Voisey, M.D.Lond., F.R.C.S.